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ABSTRACT

Project VISION (Visually Impaired Students and Internet Opportunities Now) was a 2-year effort to develop and test methods and strategies by which blind and visually impaired students can use assistive technology to gain access to the resources found on the Internet. The project produced a manual and a videotape. Nine students were provided with assistive technology, including portable braille printers, portable ink jet printers, screen reading software, speech synthesizers, braille translation software, and screen enlarging software. Teachers were first trained to use the technology in accessing the Internet and then instructed their students in the methods and procedures during the following academic year. After an introduction to the project, the manual provides basic information on the Internet, including its origins, structure, access, and available tools. The following section explains the students' computer systems and the assistive technology available. Remaining sections offer information on connecting to the Internet and training of teachers and students. Seven appendices provide additional information on hardware and software, topics included in the teacher training component, guidelines for teacher and student logs, eight sample lesson plans, sample newsgroups, resources about the Internet, and resources about the Internet in accessible format. The manual is also provided on a computer diskette and on videocassette. Contains three pages of references. (DB)

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Project VISION

Visually Impaired Students and Internet Opportunities Now

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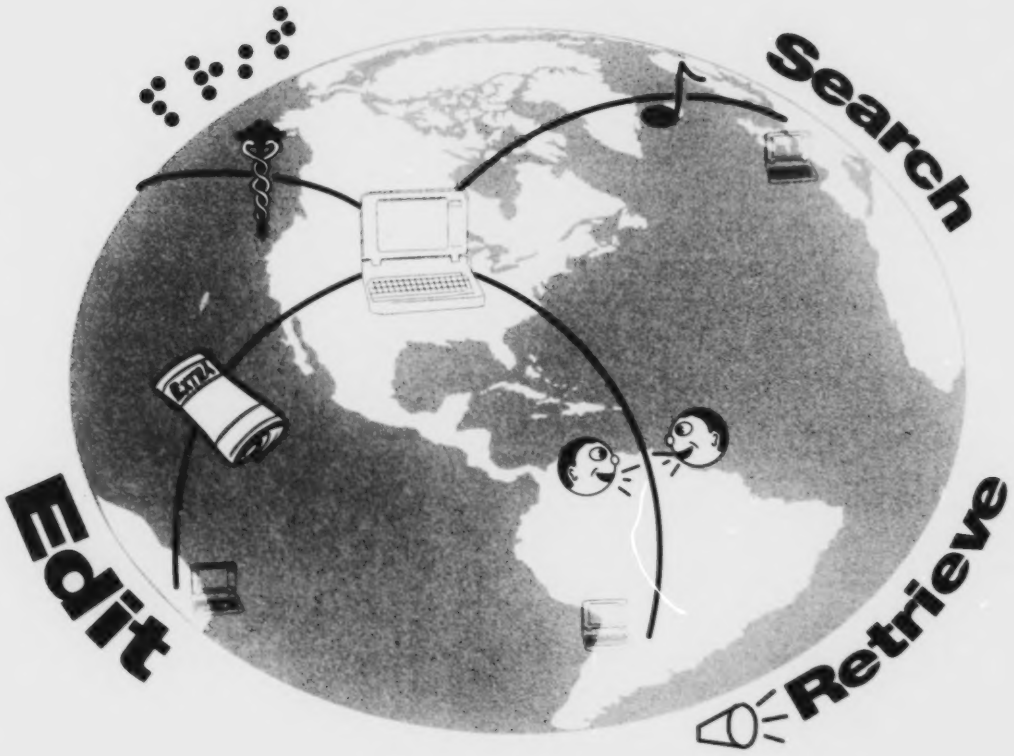
Project VISION

Visually Impaired Students and Internet Opportunities Now



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Students	*School*	*Teachers*
Eric Fanning	Glenbard East High School Lombard, Illinois	Janet Huff
Ameenah Ghoston	Curie Metro High School Chicago, Illinois	Sue Schieve
Clinton Jones	McHenry East High School McHenry, Illinois	Anita Forbes
Leigh Morman	Willow Brook High School Villa Park, Illinois	Tracy Wilks
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INTRODUCTION TO PROJECT VISION

Project VISION was a two-year effort to develop the methods and strategies by which blind and visually impaired students can use assistive technology to gain access to the numerous resources found on the Internet. These methods were rigorously field tested. This manual and accompanying videotape resulted from the efforts of the teachers, their students, and the staff of the Research and Development Institute (RDI).

The Internet is a vast and ever-growing global network of computer networks. Millions of people and organizations contribute to the enormous information reservoir which constitutes the Internet. They also use the network to communicate with one another.

For blind and visually impaired persons, the Internet holds the unprecedented promise of access to unlimited amounts of information, and opportunities to interact with countless other persons. These are two major life challenges faced by all severely visually disabled individuals. Because of the absence of normal sight, these individuals experience difficulty gaining ready access to large amounts of written information. In addition, social isolation is, all too frequently, a circumstance in which they find themselves. Access to the Internet can help solve these problems. The information contained in this manual and presented on the videotape is designed to assist teachers to help their students acquire the skills and knowledge necessary to "travel the Internet."

The staff of Project VISION developed the methods which visually disabled students can use in gaining access to the Internet. The procedures, using assistive technology, were task analyzed. A first draft of the instructional manual was developed using that information. Nine students and their nine itinerant/resource teachers were chosen from a larger pool selected from Illinois and Wisconsin high schools. The appropriate assistive technology was purchased. During the summer months, the teachers were trained to use it in gaining access to the Internet. During the following academic year, they instructed their students in the methods and procedures developed by the project staff. The students field tested those procedures. During the field test period, data were collected vis-a-vis the effectiveness of the instructional materials. During the second half of the academic year, a videotape was

produced. Following the close of the academic year, revisions were made in the manual.

The access hardware and software which were used by the blind and low vision students in the project are briefly described below. The fuller technical description can be found in subsequent sections. The students were trained to use very portable, adapted computers equipped with speech synthesizers and internal modems. The blind students were given portable braille printers and portable ink jet printers; whereas, the low vision students used only the portable ink jet printers. All of the blind students and some of the low vision students used screen reading software to drive their speech synthesizers. The blind students were given braille translation software to use with their braille printers. The low vision students were given screen enlarging software to increase the size of the text on their computer screens; they also had the capability of printing in large print. Both groups had the necessary word processing and telecommunications application software. They then had the capability of gaining access to the Internet resources from any location, be it school or home, at any time of the day or night.

The ultimate goal of Project VISION is to make it possible for blind and visually impaired persons to join the Information Age by gaining unhampered access to the vast resources found on the Internet. That access will go far in helping them achieve equity in access to information and enabling them to enhance their inclusion in society.

THE INTERNET

What is the Internet?

The Internet is a giant worldwide network system connecting hundreds of thousands of computers, each of which can then be connected to its own local network of even more computers—in much the same way that interstate highway systems connect state and local highways and roads. As a result, when someone accesses the Internet, he or she is really just accessing an individual computer somewhere. Then that computer can access another computer, which can access another computer, and so on, around the entire world. In this way, the individual now has access to hundreds of thousands of computers—and tens of millions of users around the world.

When someone is on the Internet, however, he or she moves from computer to computer, from country to country, without ever having to leave his or her personal computer. One only has to dial up an Internet Service Provider (ISP), use the appropriate Internet software tool, and he or she is on the way to accessing enormous databases, downloading files from far away hosts, and exchanging messages with others from around the world.

This global network of interconnected computers has obvious impact on information sharing. LaQuey (1993, p. viii) states that "the Internet can shrink the world and bring knowledge, experience, and information on nearly every subject imaginable straight to your computer," and Gibbs and Smith (1993, p. 4) suggest that the "really striking thing about the Internet is its constant growth." Yet, despite all the databases, the infinite amount of information made available, and the exponential growth of that information, Hahn and Strout (1994, p. 3) suggest that "what is most important is the people. The Internet is the first global forum and the first global library. Anyone can participate, at any time; the Internet never closes. Moreover, no matter who you are, you are always welcome."

The Internet is an amazing resource, but "much like the oil or water reserves deep beneath the surface of the earth, this resource is of little use to you personally if you can't get to it—or it get to you" (Lambert & Howe, p. xx, 1993). This issue of accessibility is of obvious concern to persons who are

blind or visually impaired, since "getting to it" involves considerable additional effort and adaptation.

What Can You do on the Internet?

Through thousands of related networks, Internet members ask and answer questions, exchange information, download programs, play games, talk philosophy, and much more. The full extent of the information and services available on the Internet is beyond comprehension, the product of 20 million minds and 2 million computers. If you can imagine it, it's probably on the Internet, or soon will be. And, since the Internet is so interactive, all members can be participants.

The Internet is often incorrectly described as only a research and education network. While it started as, and continues to be, an extraordinary research and educational tool, business users have been a major source of Internet growth during the past several years. In fact, people can conduct a wide range of legal commercial activities through the Internet.

Several examples of specific types of activities that one can engage in through the Internet are described here:

- send electronic mail to other users. Electronic mail (popularly known as "e-mail") is a favorite use of the Internet. It is perhaps the most flexible, convenient, and inexpensive form of long-distance communication ever developed. E-mail will arrive at its destination within seconds, whether it is going to other users on the Internet or any other networks with electronic mail.
- keep abreast of the very latest information using the Usenet, the world's largest bulletin board. This forum is a nonstop discussion of over 6,000 different subjects. If you have a question, just post it to the appropriate newsgroup. This way you can get answers to your questions by virtually asking 20 million people.
- exchange messages with members of special-interest discussion groups, called listserves. You can join thousands of special-interest mailing lists and newsgroups. No matter what your interests are, you can find a discussion group full of people with similar interests.

- search for information. You can search the hundreds of thousands of computers on the Internet for information you need on just about any topic you are interested in. Public database access and retrieval services, as well as large software libraries, are available. Live connections to chat groups, conferencing, and gaming forums are also available.
- download files. When you find the information you want, you can easily download files from these other computers directly to your own personal computer.
- explore the vast array of resources through the World Wide Web. Currently, the most popular feature of the Internet, the WWW allows you to link multiple documents without having to use menus.

How Did the Internet Get Started?

The Internet actually began in 1969 when the U.S. Department of Defense supported teams of scientists to research computer networking. The government organization Advanced Research Projects Agency (ARPA) developed ARPANET which created a computer network where information was broken down into small units which could travel independently of each other until they reached their destination. This allowed the units of information, even in cases of war or other catastrophe, to continue to travel through alternate routes, and even be resent if necessary.

The scientists using ARPANET found that the system was also very effective for sending electronic mail and sharing information. In 1983, ARPANET split into two separate networks: ARPANET for civilian research efforts, and MILNET for military use. The interconnection of these two networks became known as the Internet.

In the early 1980s, other networks also developed to serve specific groups or communities. For example, BITNET (Because It's Time) was developed for academic communities, and CSNET (Computer Science Network) was developed for a variety of researchers. Eventually, these networks became part of the Internet so that their users could share information.

In 1986, the National Science Foundation connected researchers across the country with five supercomputers. The network that connected these supercomputers was known as NSFNET, and this process formed a communica-

tions "backbone", supporting most of the messages and data that travel from place to place. This backbone is actually made up of fiber optic wires, and microwave and satellite links, capable of transmitting vast amounts of information in remarkably little time.

The Internet gained its nickname as the "information highway" because data travels from an individual's computer to the transmission lines of the backbone which can carry it around the country or around the world, and then through regional and local networks to the intended destination—much like people travel local roads to highways to interstate highways, then exit and work their way through regional and local roads to their destination.

Structure of the Internet

Even though the Internet is composed of thousands of computers, of different types and brands, they all must follow a set of requirements. These requirements give the Internet a certain amount of structure. Each computer connected to the Internet must have two things, a valid Internet name and a system for storing and retrieving files.

The computer's name is similar to a person's name. Instead of a first and last name, it must contain it's name, the organization's name and the type of organization it belongs to. A computer's name is known as it's Internet address.

The structure for storing and retrieving files is vital. Without it, the Internet would be useless. The structure used for storing and retrieving files consists of two parts: directories and files. Directories are used to organize files into groups. The groups are generally broad categories. Individual files are then stored within the directories.

Accessing the Internet

There are many ways of accessing the Internet. Many different organizations provide free access to the Internet. Organizations include public libraries, businesses and colleges/ universities. But to gain access to the Internet through one of these sources, one must belong to the organization. People who do not must look elsewhere for access. Many people access the Internet through local bulletin board systems, and commercial online services such as CompuServe and America Online, or they use an Internet Service Provider. An ISP is a

company that sells access to the Internet for a monthly charge. Project VISION used a commercial provider which is based in Chicago.

To access the Internet, one must have the following items:

1. A computer with a modem.
2. Telecommunications software.
3. An account on a computer that has access to the Internet.

Account Types

The two types of accounts that most individuals have, are either dial-in or SLIP/PPP (Serial Line Internet Protocol/Point to Point Protocol). Dial-in accounts allow one to use standard telecommunications software for accessing the Internet, while SLIP/PPP accounts require the use of software designed specifically for accessing the Internet. Project VISION used a SLIP/PPP account. The reasons for doing this include:

1. The ability to download information directly to the student's computer.
2. More users and Internet Service Providers are using this type of account.
3. One can access every tool/service available through the Internet.

Available Tools

To gain a better understanding of the versatility of the Internet, and the type of information that can be accessed, one must consider the tools that are available for using the Internet. These tools include:

E-mail. The Internet makes it possible for users to exchange messages with other users around the world including those who subscribe to commercial online services such as CompuServe, Genie, America Online, DELPHI, and The WELL. In addition, one can subscribe to mailing lists that let him or her post and receive e-mail on a wide variety of topics.

File Transfer Protocol (FTP). Another widely used feature of the Internet is its capability to transfer files from one Internet-connected computer to another. FTP allows Internet users to search for, list and retrieve files. The Internet's Archie service indexes files from over 900 FTP sites.

Finger. The Internet's Finger command allows one access to identifying information (such as full name and postal address) about anyone with an Internet mailing address.

Gopher. Gopher, a project of the University of Minnesota, is a menu-driven service that lets users browse the Internet's resources, read and retrieve text files.

Internet Relay Chat (IRC). Internet Relay Chat is the Internet's world-wide, multi-lingual chat board, like CompuServe's CB Simulator and America Online's People Connection, but bigger and more chaotic. IRC is divided into hundreds of categories, where users talk live around the clock about everything from Russian politics to true romance. Like the commercial services, IRC allows an individual to chat privately about things that he or she does not want the whole Net to know about.

Telnet. Telnet, or remote login, enables a computer user in one location to use the Internet to tap into another computer somewhere else. A valid account name and password may be required. Once the connection is made, the remote user can use that system as if that computer were part of his or her own network. Telnet can be used to access everything from bibliographic databases (primarily library catalogs) to computer bulletin boards and interactive role-playing games.

Usenet. Not officially part of the Internet, Usenet is a collection of millions of e-mail messages organized by subject categories called newsgroups. They are the Internet equivalent of the special-interest bulletin boards available on the commercial online services, though much more specialized. There are two kinds of newsgroups: official (voted in by a majority of Internet site administrators) and alternative. Some of the official newsgroups contain the prefix **comp** (for computer-related topics), **news** (for topics related to Usenet itself), **rec** (for recreation, hobbies, and the arts), **sci** (for science and research), **soc** (for society and culture), **talk** (for issues and debate), or **misc**. Alternative newsgroups, which start with the prefix **alt**, can be started by anyone. There are more than 2500 alt newsgroups.

Wide Area Information Servers (WAIS). A joint project of Thinking Machines, Apple Computer, Dow Jones, and KPMG Peat Marwick, WAIS is a powerful searching tool that lets users search over 300 Internet sources with a single keyword.

Whois. Though there is no comprehensive directory of Internet mail addresses, the Internet's Whois feature provides a limited directory of Internet users and a utility for searching it.

World Wide Web or the Web. This is a tool that enables an individual to access documents that contain "hyper-links" to other documents. These hyper-links enable one to move directly from one document to another, without using a menu. The Web is the part of the Internet that is most familiar to Internet users.

Benefits of Internet Access for Visually Disabled Students

Visual disability brings with it several challenges. One among many is the inability to have immediate, efficient, relatively effortless access to enormous amounts of printed information. The total amount of printed information which has been transformed into braille, large print or recorded form is minuscule in comparison to the amount of printed material which is available to sighted individuals. One of the foci of Project VISION is to enable blind and visually impaired students to gain access to the large quantities of information available on the Internet, and independently to transform that material into forms which they can deal with effectively (e.g. braille, large print, or synthesized speech). Thus, access to the Internet holds great promise in helping to solve one of the most vexing problems confronted by blind and visually impaired persons—having immediate and efficient access to large amounts of information.

Efficient access to vast amounts of information is the key to success in a world in which the difference between the "haves" and "have nots" will be that access. Blind and visually impaired persons will, unfortunately, fall into the latter category without the development of effective methods for gaining access to information. Project VISION is designed to help them do that.

It is imperative that training in the procedures for gaining access to the information resources on the Internet take place during the school years. Acquiring these skills during this period in the youngsters' education will afford two important advantages. First of all, students can use the skills in their day-to-day academic work in school. Secondly, the training will prepare them for transition to post-secondary educational settings and for job-related activities that may be required of them. At no other time in their lives will

such training be more easily provided. There are few facilities in the country which can provide this training after graduation from high school.

In the post-secondary educational setting, the youngsters can also use their skills in gaining access to information to good advantage in carrying out their academic work. For example, these skills can be used by individuals to take advantage of such databases as those which are provided by libraries.

As we move further and further into the Information Age, more and more jobs will require proficiency in gathering and dealing with information effectively. Youngsters who have had several years of experience in honing these skills in their previous educational settings will be well-equipped to deal with these types of tasks on the job. Thus, they will be more employable and better prepared to take their rightful place in the work force.

A second major problem which confronts severely visually disabled persons is the inability to participate on an equal basis in the society at large. According to results of a wide-ranging study conducted by SRI International (Wagner, 1992) on the transition of disabled youths, blind and visually impaired young people are the most isolated of all disability groups after leaving school. Not being able to see well dramatically decreases one's ability to interact with others. For example, every severely visually disabled person has experienced numerous incidents in his or her life in which he or she is ignored and overlooked by the sighted persons in his or her immediate vicinity. In extreme situations, this isolation takes place even when the visually disabled person is in obvious need of assistance. In many cases, the tendency to isolate visually disabled persons stems from the fact that sighted persons feel extremely uncomfortable in the presence of blind and severely visually impaired persons. Often this feeling of discomfort and uneasiness results from a lack of knowledge on the sighted person's part about blindness and blind persons. The problem is exacerbated in that the severely visually disabled person cannot seek out others in the environment because of the simple fact that he or she cannot see them. If the sighted person will not approach a blind person, and if the blind person cannot approach a sighted person, the unfortunate result is relentless isolation. Access to the Internet offers the benefit to blind persons of equal participation with all others. On the Internet, no one knows the characteristics of others with whom he or she may communicate. This is, then, an unprecedented opportunity for blind persons to participate with others without disadvantage.

The students in Project VISION experienced the benefits of Internet access in various ways. They were able to search the Internet resources for information which they needed to complete their school assignments. They downloaded information from the Internet to store it on their computers. They then incorporated the information in their school assignments. Finally, blind students produced their work in braille or print, while low vision students produced their work in print. Use of the ink jet printers enabled the students to deliver their written assignments to their sighted, regular classroom teachers.

The students were trained to use their equipment and software to join special interest discussion groups to participate in the opportunities that the Internet affords for interaction with others. The possibilities are numerous, indeed. These include participating in countless newsgroups, "chatting" with other high school students both within the United States and internationally, discussing social issues, researching employment opportunities vis-a-vis disabled persons, discussing issues related to the Americans with Disabilities Act (ADA), exchanging information about new developments in technology for blind and visually impaired persons, and participating in recreational activities. These are but a few examples of the many opportunities that will accrue to visually disabled students who are accomplished users of the Internet. Thus, the reader can readily discern that many benefits are afforded to visually disabled students who possess the wherewithal to access the vast resources which are present on the Internet.

The Student's Computer System

This section will describe the computer hardware and software needed for each student in order to successfully participate in a comparable undertaking. There are three components of the system for each student: computer hardware, software, and assistive technology. Appendix A lists the specific components of the student's computer system.

Hardware

The Computer

Each student in Project VISION had his or her own IBM compatible computer equipped with a modem. It was decided to use laptop computers, but desktop computers could be used as well. Laptops were used because this enabled the student to take the computer wherever he or she went. This portability gave him or her the ability to use his or her computer both at home and at school, which meant that the student could then access the Internet anytime he or she desired.

Currently, three types of computers are used in most school systems. They are the Apple II series, MacIntosh, and IBM compatibles. Since new software is no longer being developed for the Apple II computer, and because of the restrictions inherent in the design of the computer, these are not suitable for use in a project such as this. The major drawback to using a MacIntosh is the fact that the only screen reading software currently available has been found to be difficult to use efficiently by visually disabled students. Since IBM compatible systems do not share these limitations, they are strongly recommended.

The Modem

Each student's computer was equipped with a modem. When Project VISION was initiated, 14,400 baud modems were the most commonly used. Since modem speed is a critical factor in the success of a project such as this, it is advised that faster modems be used. Currently, 28,800 baud is the standard modem speed.

In addition to modem speed, another option to consider would be the type of modem desired. There are three types of modems being used: internal, external

and PCMCIA. An internal modem is most often used with desktop computers. These modems must be installed inside the computer. An external modem is connected to the computer via a serial cable and can be used with a desktop or laptop computer. A PCMCIA modem is the size of a credit card, and thus will fit into a special slot located on most laptop computers currently being produced. The type of modem selected will depend greatly on the design of the system.

If it is decided to use laptop computers, then a PCMCIA modem is recommended. When deciding which brand of modem to use, it is suggested that a pop-out phone jack be selected. It was found that, with careful handling, this type of phone connector was easier for totally blind students to use. On the other hand, PCMCIA modems use a cable that dangles from a connector on the modem. This cable must be inserted and removed each time the computer is moved. Since the pins that connect the cable to the modem are very small and fragile, the student must have very good finger dexterity to insert the cable properly into the modem without damaging it. The fine motor coordination required by this type of modem may present difficulty for many students; therefore Project VISION used a pop out phone jack.

The Printer

Each student was also provided with an ink-print printer. Since the students had access to printers at their schools, it was deemed that portability was not an important factor in the success of this project. In addition, the staff found from past experience that portable printers are often problematic for blind students to use. Students can have difficulty correctly inserting the paper, which can lead to paper jams and printer failure. If a portable printer is to be used, a single sheet feeder should be considered. However, since most single sheet feeders are bulky, they are awkward for students to carry with them. Therefore, as a result of these factors, Project VISION selected desk top printers.

Although almost any type of printer can be used, an inkjet or laser printer is recommended if at all possible. These types of printers provide greater readability for low vision students. Both inkjet and laser printers enable the user to quickly change both the size and contrast of the print. Most of the students who could not read the output of a dot matrix printer could read the same material when produced with an inkjet printer. When deciding which printer to use, some things to consider include:

1. compatibility with the software chosen. It is important that the word processing program be able to utilize all the features of the printer, especially the commands for choosing the print size and type.
2. ease of inserting paper. Some of the students may have difficulty inserting paper into the printer.
3. cost and number of pages produced with an ink cartridge. The cost of replacement cartridges is an important factor when deciding which printer to purchase. The useful life of a cartridge will vary according to the size and type of the font being used by the student. Generally, the darker and larger the font, the shorter the lifetime. However, the visibility of the print is also an extremely important criterion.
4. warranty and durability. Most printers come with a one year warranty, but consideration should be given to buying extended warranties. This issue is directly related to that of durability. When deciding upon which printer to use, be sure to look for the *mean time between failure* or MTBF. This can usually be found in the technical section of the printer's manual.

Software

Operating System

The operating system is the program upon which every other program is based. Currently the most popular operating systems are DOS, Windows, and System 7.5. The first two are used on IBM compatible computers, while System 7.5 is used on the MacIntosh.

The students in Project VISION used Windows. The reasons Windows was chosen include:

1. ease of using a SLIP/PPP connection to the Internet. Given the range of computer knowledge and skills that the students and teachers had coming into the project, it was decided that this type of connection would be used. A SLIP/PPP connection uses a point and click interface which avoids the need to learn a series of cryptic steps to perform the most basic of operations.
2. the availability of access software for low vision and blind students. It is far easier for low vision students to gain access to the information using Windows than it is using another operating system, since Windows

provides users with the option of using the mouse or the keyboard for performing tasks. When the project was initiated, the first generation of screen reading programs for Windows was being released. As a consequence, products should be evaluated before deciding upon an operating system. Currently the MacIntosh has only one screen reading and two screen enlarging programs available.

3. familiarity with the operating system. To reduce training time, it is important to select a system with which most of the teachers and students are familiar. In this project, a majority of teachers were more familiar with Windows than they were with the other operating systems.

Internet Software

The software used to access the Internet depends upon the type of account being used. Presently there are three types of accounts that are used to access the Internet. They are: a UNIX shell account, an account with a commercial online service, and a SLIP/PPP account.

A UNIX shell account provides a text only method for accessing material on the Internet. The user of a UNIX shell account uses a combination of a menu and the UNIX command line. The menu contains options for accessing the various areas of the Internet, while the command line must be used to download information to one's computer. All the data saved from the Internet are stored on the host computer to which the individual is connected. To transfer the information to his or her computer, another step is required. If a UNIX shell account is the method being used, the only software needed is a telecommunications package. Telecommunications programs are widely available at a low cost. They range in price from $30 to $100. Many modems are shipped with telecommunications software configured for the user's modem.

If one has an account with a commercial online service such as America Online, CompuServe, or Microsoft Network, the only software required to access the Internet is provided when the account is activated. Many modems are packaged with trial offers from these services.

Project VISION used a SLIP/PPP connection because its point and click interface avoids the necessity of learning additional steps. The rest of this section details the software needed to access the Internet through a SLIP/PPP

account using a local Internet Service Provider. The number of programs and the function they perform varies from provider to provider, but the software can be categorized by the functions/tools listed below.

Network Dialer. The network dialer program uses the modem to call into the account provider's computer. After connecting, it can then be configured to send the individual's login name and password to that computer. When he or she wishes to disconnect his or her computer from the Internet, this program is used to close the connection and hang up the phone. Some sample programs include Trumpet Winsock, Net Dialer, and Mac TCP/IP.

Electronic Mail. Electronic mail programs (or e-mail) are used to send messages to another person located on the Internet, or any other network which has e-mail capability. Some examples of e-mail programs include Eudora and Pegasas.

Web Browser. A web browser is used to access the World Wide Web (or WWW). The World Wide Web is the fastest growing portion of the Internet. It also gives one access to the most current varied information. This program can be used to access other areas of the Internet such as newsgroups or gopherspace, or FTP. Some commonly used web browsers include Netscape, Internet Explorer, Cello, and Mosaic. WebSpeak, an accessible browser, does not require screen review software, nor does it require screen enlarging software. Both speech output and large print display are incorporated in WebSpeak. It requires the Windows operating system and a sound card. It will work with a modem, or on a network to access the Internet.

Newsreader. A newsreader is used to access the Usenet Newsgroup portion of the Internet. Usenet newsgroups can be thought of as community electronic mail. Each group revolves around a single topic. If persons wish to contribute to the group discussion, or have a question about a specific topic, they can simply send a message to the group and hopefully someone will have an answer for them. Newsgroups can be very useful sources of information. Some commonly used newsreaders include Free Agent, Trumpet Newsreader, and WinVN.

Gopher Client. This program provides access to gopherspace. Gopherspace is a feature of the Internet which organizes information into menus, much like a card catalog. It is probably the simplest way to access information from the

Internet, but it is also the slowest and most unreliable. Most people use their web browser to access this information because the hyper-links of the WWW are more efficient than the menu-driven gopher.

FTP Client. FTP is short for File Transfer Protocol, which simply means it is used to download any file from the Internet to a person's computer. Since many of the above programs have the capability of viewing and saving information from the Internet to an individual computer, FTP programs are used mainly to download software. Again, most people use their web browser to download software rather than use this type of program.

Telnet. This program enables you to log onto another computer. Telnet can be used to log onto bulletin board systems, as well as many libraries. Many local, regional, university, and national libraries are accessible through the Internet. Examples of national libraries that are available through the Internet are the Library of Congress system and the CARL system. Some examples of telnet programs include EWAN, Anzio, Trumpet Telnet, and QVT/Term.

Utilities. The most common utilities required for using the Internet are decompression software and image viewers. When software is put on the Internet for downloading, it is in a "compressed" state. Programs are compressed to save room on the computer from which the user is downloading them, and compressing programs makes them download faster to his or her computer. Decompression software is needed to restore these programs to their original size. The programs are not usable in their compressed state. Some examples of decompression software include Pkunzip, and Unstuffit. Image viewing software is used to view pictures that have been downloaded from the Internet. Applications include ACDSee, Lview, and Paintshop Pro.

Although it is not necessary in order to use the Internet, serious consideration should be given to buying a high quality virus detection program. This is especially important if you will be downloading software such as games from the Internet. A high quality virus scanning program can be purchased for about $40.

Word Processor

A word processing program is necessary for the students to read and edit the material that is retrieved from the Internet. Although any word processor may be used, it should have the following characteristics:

1. It should be familiar to the teachers and students. This will greatly reduce the amount of training time required.
2. It should be easy to use with access products. Most screen reading programs have preconfigured settings for the most popular word processing programs.
3. It should have the ability to import ASCII files. Most of the information that is saved from the Internet is stored in an ASCII file. An ASCII file contains only text. Most word processing programs have the capability of gaining access to files of this type.

Assistive Technology

This section describes the access equipment and software used in Project VISION. Because both blind and low vision students were involved in the project, the section is divided into those two categories.

Technology for Blind Students

In addition to the computer, hardware and software listed above, each blind student will also need: (1) speech synthesis (a speech synthesizer and screen reading software), (2) braille translation software, and (3) a braille printer.

Speech Synthesizer and Screen Reader

For the production of synthetic speech, two components are needed: a speech synthesizer and appropriate screen reading software. A speech synthesizer is hardware that produces human-sounding speech. It is used in conjunction with the screen reading software. Currently there are three types of speech synthesizers available: internal, external, and PCMCIA. The type of synthesizer selected will depend upon the type of computer chosen. In general, internal speech synthesizers are used with desktop computers. They have to be installed in a computer the same way an internal modem would be installed. An external speech synthesizer can be used with a desktop or a laptop. It is attached to the computer using a serial port. A PCMCIA speech synthesizer fits a PCMCIA slot found on most laptops currently available.

CONSIDERATIONS FOR SELECTING A SPEECH SYNTHESIZER. In selecting a speech synthesizer, it is recommended that the following issues be considered:

1. type of connection available on the computer. In general, if the computer has an internal slot which the synthesizer will fit, use an internal synthesizer. If the computer has no such slot, then an external synthesizer must be used.
2. quality of speech produced. It is not always necessary to get the highest quality of speech available. Most people who rely on speech synthesis can learn to understand a less human-sounding voice without difficulty.
3. price. Speech synthesizers range in price from a few hundred dollars to over a thousand dollars. The price is directly related to the quality of the speech. Generally the higher the price, the better quality of its speech.
4. screen reading software used. This is an important factor. Not all speech synthesizers work equally well with all screen reading programs. In fact, some screen reading programs will not work at all with certain speech synthesizers. To ensure that they will work together, it is advised that the producer of the screen reading program be contacted. The company should also be able to supply information regarding the limitations that a selected synthesizer might have with its product.

CONSIDERATIONS FOR SELECTING SCREEN READING SOFTWARE. When deciding which screen reading software to purchase, consider these factors:

1. compatibility with the speech synthesizer. This issue was addressed in #4 above.
2. capability to select portions of the screen to read automatically. This feature was found to be very efficient for achieving access to information by the blind user. It allows the user to quickly have specific portions of the screen read automatically as that information changes.
3. the capability to save and retrieve the speech settings. These should include the settings for pitch, rate, volume, and areas of the screen to be read. The screen reader enables the student to save these settings for each program that is used.
4. ease of learning. This factor is important for reducing the amount of training time required for the students and the teachers.
5. ease of use. The capability of maintaining hand position on the home row keys while using the screen reading program enables more efficient operation of the program. When hands must be removed from the home row position, as is necessary with some screen reading programs, that

efficiency is diminished. Logical commands and readily-established speech settings also foster ease of use.

6. cost. Screen reading programs range in price from a few hundred dollars to over $1000, with the average price approximately $500. Generally, the higher the cost, the more features are included in the program.
7. compatibility with chosen application software. To determine if the chosen screen reader will work in conjunction with a program, the producer of the screen reader may be asked for a demonstration copy. The "demos" are free and usually contain a full feature version of the program that will discontinue working after a period of time. If a demonstration copy is not available, arrangements may be made to use the software for a short evaluation period.
8. the capability to eliminate possible keyboard conflicts. There is one rule of thumb for screen reading programs: the more application programs used, the greater the chances of creating a keyboard conflict. A keyboard conflict occurs when two programs use the same keystrokes to perform two separate actions. For example, suppose the word processing program uses ALT P to print, while the screen reading program uses ALT P to read the current paragraph. When ALT P is pressed, one of the programs will prevent the other from performing its action. In this case, the current paragraph will be read every time the ALT P command is used, and the print command will never be issued to the word processing program. Therefore, it is essential that the speech program have some method for eliminating this conflict; most use one of three techniques:
    a. bypass command. A bypass command tells the screen reading software to ignore the next command. This enables the other program to act upon it.
    b. unusual commands. Some screen reading software use commands that few other programs use. This results in awkward commands for the screen reader.
    c. changeable commands. A few screen reading programs allow commands to be changed so they will not be the same ones that an application program is using.
9. capability of the screen reading program to use the keys located on the keyboard (especially if a laptop computer is being considered). Many screen reading programs use the numeric keypad located to the right of

the keyboard for it's commands. Although these keys can be simulated on most laptops through the use of a built-in overlay, it is often awkward to do so. For example, the command to read the next line on the screen might be INSERT and DOWN ARROW, and on a laptop it would be Fn and F10 (to activate the built-in overlay), M (to change into the INSERT key), and K (to change into the DOWN ARROW), then Fn and F10 (to turn off the built-in overlay). As can be seen, one would have to perform three separate actions to replicate one command. Some laptops have external numeric keypads available, but the RDI staff was not able to find one that worked with the WinVision screen reading program which was used in this project.

10. capability of the screen reading program to work with the chosen World Wide Web browser, if a SLIP/PPP connection is chosen. Many pages located on the WWW contain forms into which the user must enter information. The sighted user would locate the form on the screen, move the mouse pointer into a box that he or she wishes to fill in, click the mouse, and then start typing. He or she would then click on a button located next to the box, indicating that he or she is finished. In order for the blind individual to perform these same functions, the screen reading program must be able to:
    a. search the screen for the box. If this is not available, then the user should be able to search for a term that appears before the box.
    b. announce the type of cursor that is currently on the screen. The cursor will change shapes depending upon the type of item on which it is positioned. For example, the cursor might change from a normal mouse pointer to a blinking cursor when it is located over a box.
    c. click the mouse with the keyboard. The clicking of the mouse places the cursor in the box.
    d. search for and move to a button. Often the user cannot proceed without finding and clicking on a button that is located near the box that was just filled in.
11. the capability of easily moving from one link located on the screen to the next. When doing this, the user should be able to hear the text within the newly identified link and/or the location the link is pointing to. The location is usually displayed on the status line of the web browser.

12. the capability of moving and clicking the mouse if the student is using a graphical user interface. This is necessary because not all programs make all of their features available via menus or keyboard commands.
13. the capability of changing the amount of auditory feedback provided when reading the screen. In some cases, screens can be very "busy", leading to possible confusion on the part of the user. Limiting the amount of auditory feedback could reduce this confusion.

Braille Production

In addition to having technology for speech synthesis, each blind student needs the technology to enable him or her to read information via the braille medium. This technology consists of a braille printer and braille translation software, or an electronic braille display.

CONSIDERATIONS FOR SELECTING A BRAILLE PRINTER. It is important that the blind student have access to a braille printer for producing paper copies of documents. Some important factors for choosing a braille printer include:

1. compatibility with braille translation software. This should not be a problem since many of the translation programs can be configured to drive a wide variety of braille printers.
2. price. This is a very important factor in deciding which braille printer to use. Presently, the price of a braille printer ranges from $1500 to well over $4000. The less expensive printers were able to meet the needs of the students in this project.
3. speed. The speed of printing a document is directly related to the purchase price of the printer. The less expensive models emboss at about 15 characters per second, while the more expensive versions emboss at about 40 characters per second.
4. amount of expected usage. The expected usage is an important consideration. Generally, the higher the cost of the braille printer, the more durable it is. If heavy usage is expected, then a more costly printer should be purchased.

CONSIDERATIONS FOR SELECTING BRAILLE TRANSLATION SOFTWARE. Braille translation software is used to translate the saved information into braille. Some considerations for choosing a translator include:

1. accuracy of the translation. Modern braille translation programs have achieved remarkably high degrees of accuracy.
2. ability to import the selected word processor's files. This can be restated as: "Can the braille translator use the documents created by the word processor?" The answer to this question must be "yes" if it is to be of any use to the blind student.
3. ability to import documents downloaded from the Internet. Since documents are available in a wide variety of file formats, either the braille translator software or the word processing program must be able to read these files.
4. ease of use. It should not require a lot of time or effort to produce a braille version of the documents wanted in braille.
5. compatibility with screen reading software. For a braille translator to be usable by a blind student, it must work with the selected screen reading software.
6. cost. Most braille translators cost about $500.

Electronic Braille Displays

It is possible that electronic braille displays could be put to good use in a project such as this. However, sufficient resources did not exist to evaluate such devices. Therefore, the staff cannot speak to the effectiveness of the use of braille displays in gaining access to the information available through the Internet.

Technology for Low Vision Students

The low vision students need two methods for enlarging the material they encounter. The first method is screen enlargement, and the second is print enlargement. Screen enlargement gives the low vision user the ability to enlarge the material that is displayed on the computer screen. Print enlargement gives the user the ability to enlarge the material that is printed on a printer.

Depending upon the degree of vision loss, it may not be necessary to use screen enlargement. Some low vision users can gain access to the information displayed by making minor changes to the computer's settings. These changes nclude: adjusting the screen's brightness and contrast, changing the colors

used, using software to enlarge the cursor or mouse printer, or using a large monitor. Also, other low vision devices may be used in lieu of screen enlargement. Large print output can sometimes be achieved by changing the default font used by the printer, and printing a darker copy.

Screen Enlargement

Currently, there are two methods for providing screen enlargement. The first method uses a combination of computer hardware and software, while the second uses software only. It is suggested that both methods be evaluated when deciding upon a screen enlargement method. Considerations for selecting screen enlargement products include:

1. range of enlargement. The available range of enlargement is from 2 to 16 times the normal size. It is important to remember that the greater the enlargement, the smaller the field.
2. clarity of enlarged letters.
3. compatibility with hardware and software, including any screen reading program.
4. capability of enlarging selected areas of the screen. The screen enlargement software should give the user the ability to determine what portions of the screen are to be enlarged, along with how much of the screen should be enlarged. For example, the option should exist to be able to enlarge the images appearing on the entire screen, or any portion of the screen.

Print Enlargement

Special software that will enlarge the print from the printer may or may not be necessary. Many currently available word processors include this feature. If a PC with Windows or a MacIntosh is used, this feature is readily available. If DOS is used, some of the most popular word processors have this capability, while many older programs do not. If it is found that the word processor being used does not have this feature, then special font programs can be purchased.

The above discussion provides the reader with a description of the required hardware and software which enable blind and visually impaired students to access the vast resources of the Internet.

CONNECTING TO THE INTERNET

To connect to the Internet you need to perform the following steps:

1. Determine the type of computer to be used
2. Choose an organization that has access to the Internet
3. Determine the type of account to be used
4. Obtain and install the required software
5. Connect to the Internet

Determine the type of computers to be used. The ease at which one can access the Internet depends heavily on the type of computer one is planning to use. When determining the equipment to be used, consider these factors:

a. speed of central processing unit. The central processing unit, or CPU, is the chip that determines the speed at which the computer operates, as well as the type of operating system used. The slower the CPU, the longer it takes to display graphics and update the screen contents. The speed is measured in terms of megahertz or MHZ. The greater the number of megahertz, the faster the computer operates.

b. operating system used and memory (RAM). Currently there are three operating systems in use. They are DOS, two versions of Windows, and Mac OS. DOS based computers require the least amount of memory (640K bytes) and the slowest CPU, but they also offer the most restrictive access to the Internet. Both versions of Windows require a relatively fast CPU and a large amount of memory to use the Internet effectively. Windows 3.1 requires 4 megabytes of memory and a 486 generation CPU. To use Windows efficiently, a minimum of 8 megabytes of memory is suggested. To use Windows '95, a fast 486 processor or a Pentium chip is required, and it is recommended that the computer contain 16 megabytes of memory. To access the Internet using a MacIntosh computer, one should have at least 4 megabytes of RAM and a relatively fast CPU.

c. modem speed. The faster the modem, the less time it takes to retrieve the same amount of information. If you are using a computer that runs Windows or a MacIntosh, the faster the modem the better. This is

because the software that is used to access the Internet is designed to download and display graphical information automatically. Since graphic files are often very large, it can take several minutes to download a single picture.

Choose an organization that has access to the Internet. There are many organizations that offer Internet accounts free of charge to their members. Also, many high schools, colleges, and universities provide free Internet accounts to their staff and students. If this option is not available, then another method of establishing an account to the Internet is through an Internet Service Provider. An ISP is a commercial organization that provides access to the Internet for a fee. The fee usually averages about $20 per month. There are two types of Internet Service Providers, local and national. Local ISPs serve a very specific town or region. National ISPs provide service to cities around the country.

A full service provider makes available a variety of services for individuals and businesses, including an Internet connection, training, customer support, and so forth.

One can obtain a list of service providers in his or her area through InterNIC. The address is:

Network Solutions
Attn: InterNIC Registration Services
505 Huntmar Park Drive
Herdon, VA 22070
Phone: 1-703-742-4777

One may also be able to find service providers in his or her area by consulting:

- the local telephone directory under headings related to computers/Internet Service Providers
- advertisements in local computer magazines
- a local computer store or computer user group
- a local university that is connected to the Internet.

Some questions to consider when contacting a service provider:

- What connection services does the organization offer? Ask for a description of the service in detail (that is, until the information is fully understood).

- What is the cost?
- What is included in the cost? Some common costs include: the type of hardware/software, maintenance (ask specifically what maintenance is included), and a membership fee.
- Are there connect time limits?
- Are there any other kinds of charges not included in the initial cost?
- What support services are offered? Ask them for an explanation.
- What training is available? Is it included in the above cost?
- Does an acceptable use policy exist?
- Is there a full time, professional staff available?
- Are there limitations to connecting to other parts of the Internet (that is, can one go everywhere one needs to go)?
- Are references available from other clients?

Determine the type of account to be used. Individuals usually have three types of accounts from which to choose. The first is a UNIX shell account. The UNIX shell account provides text-only access to the Internet. To use this type of account efficiently, the user should have some knowledge of the UNIX operating system. UNIX is similar to MS-DOS, so if you are not comfortable with MS-DOS, you will probably not want to use this type of account. The advantage of this type of access is that the computer hardware and software needed to use it are minimal. Any computer equipped with a telecommunications program and a modem may be used with a UNIX shell account. Some of the disadvantages include the number of extra steps that are required to download material from the Internet to one's computer, and the number of different commands needed to access programs and to move among them. These two factors greatly increase the amount of time the user needs to effectively use the Internet.

The second type of account is a SLIP/PPP connection. A SLIP/PPP account provides a graphical interface to access the Internet. If one decides to use Windows or the MacIntosh, then he or she should use a SLIP/PPP account to make full use of its capabilities. A SLIP/PPP account is much easier to learn and use than is a UNIX account. To access the Internet using this method, special software is required. This is the type of account that Project VISION used.

A third type of account is available through commercial online services such as America Online or Compuserve, and requires no additional software.

Obtain and install the required software. The software required to use a SLIP/PPP connection is usually available free of charge or for a small setup fee, and can be obtained from the organization or Internet Service Provider when service is established. The software typically consists of a program that dials into the Internet, and other programs to access the various areas on the Internet. These other programs usually include a program for sending and receiving e-mail, and software for using the World Wide Web.

Connect to the Internet. After connecting the modem to the phone line, the user will run the network dialer program. This program may use a script to automatically dial into the user's account. After a connection is made, he or she will be prompted to enter his or her login name. A login name is the name he or she provided to his or her Internet Service Provider. This is the name the user is known by on the Internet. Next, the user will be prompted for his or her password. When entering the password, it will not appear on his or her screen (usually an asterisk appears for each character typed). One should never give one's password to anyone. When entering one's login name and password, one should be sure to enter them exactly as they appear with his or her ISP, since both are case sensitive. If the user's password is "abby" and "Abby" is typed, access will be denied since an uppercase A is different than a lowercase a. After one's login name and password have been verified, he or she is logged onto the Internet. He or she may now run any of the Internet applications.

TRAINING

The training procedures incorporated into Project VISION consisted of five components. The first three of these involved the training of teachers by RDI staff, and were organized as follows: (1) instruction on basic computer operation and Internet access; (2) practice and experimentation phase, where teachers were encouraged to use the computer in their homes as often as possible, not only to become more confident in its use, but to spend time searching through the Internet; and (3) instruction on the adaptive software that would be used with their particular low vision or braille reading student.

The training continued with: (4) the subsequent training of students by the teachers in the project, and (5) the technical support for teachers and students by RDI staff.

Training of Teachers

The first phase of teacher training took place at a one-week workshop. The six-hour daily training sessions began with basic computer operation and advanced to Windows, communications software, aspects of accessing the Internet, using e-mail, accessing and subscribing to newsgroups, the World Wide Web, and search tools within the Web. Teachers varied in prior computer knowledge and experience. However, it is recommended that teachers have basic computer knowledge, word processing skills, and basic knowledge of Windows before beginning the training incorporated in Project VISION.

During the second phase, the teachers were able to take the computer equipment home for six weeks. They were encouraged to use the computer as often as possible during this period before school began. This proved to be an excellent time for resolving any problems before introducing the system to the students. It also gave the teachers an opportunity to become comfortable with the computer as well as time to browse through the Internet to locate interesting sites both for themselves and their students.

The third teacher training phase was held in two separate training sessions. The teachers of the low vision students met separately from the teachers of braille reading students. This was done in order to give these teachers specific instruction on the types of adaptive software that were being used for their

particular students. Both groups began with a follow-up on the initial training to answer any questions and resolve any difficulties that may have occurred. This was followed by training for the low vision teachers on the screen enlargement program and ink jet print printer. The braille teachers learned how to use the screen reading software, the speech synthesizer, braille translation program, braille printer, and ink-print printer. These sessions both took place during a six-hour day. Because of the volume of information that the braille teachers were required to learn, this session could very well go into a second day if necessary.

Following is an outline of the subject matter covered during the initial one-week training session for all of the Project VISION teachers:

I. **Orientation to the Laptop Computer**
Hardware components, connecting devices, keyboard layout, running application software, power saving features, battery charging, and computer care.

II. **Introduction to the Internet**
Function of the Internet, contents, access, account types, available tools, structure, and connecting procedures.

III. **Electronic Mail**
Parts of a message, basic e-mail, reading mail, tips for writing, sending, finding text within messages, Internet addresses, expressing emotions, and discussion lists.

IV. **Usenet Newsgroups**
Explanation, group organization, article components, using Trumpet, joining and quitting newsgroups, reading articles, article viewing options and creating new articles.

V. **Using Telnet**
Explanation, starting Telnet, addresses, commands, using the program, predefined Internet libraries, bulletin board lists, and free-net lists.

VI. **Using FTP and Archie**
Explanation, using FTP, using Archie, connection procedures, and finding files to download.

VII. **Using Gopher**
Explanation, starting Gopher, navigating through menus, information types, and searching gopherspace.

VIII. **The World Wide Web**
Explanation, starting Netscape, screen layout, parts of a web page, navigating the Web, saving Web information and searching the Web.

A more detailed list of the specific training topics covered throughout the workshop can be found in Appendix B.

The teacher training sessions were held during the summer for the following reasons:

1. Teacher Location. Teachers were located throughout a wide geographical area. It would have been very costly and time consuming to provide individual training at the various sites.
2. Teachers' Schedules. Since the teachers were from a variety of school districts, it would have been difficult for them to receive time off during the school year, during the same time period, to participate in the training.
3. Level of Technical Expertise. Some of the teachers, before being involved with the project, had limited computer experience. It was felt that a more intensive training period, with time for continuing practice using the equipment and the word processing and adaptive software programs, would be important for the teachers to acquire the necessary skills before teaching them to their students.

Providing the teacher training in this multi-faceted program proved to be an excellent way to give teachers the opportunity to spend time on their own to become proficient with the system before presenting it to their students. With the intervening six-week practice period, the teachers were also able to have their questions answered and have any problems resolved well in advance of student training. Dividing the third phase of training between teachers of low vision students and teachers of braille reading students allowed for more intense instruction on the specific software, equipment and applications for these particular groups.

Student Training

After acquiring the necessary knowledge and skills, each teacher was responsible for training his or her student to use the equipment provided. The RDI staff felt strongly that the teacher should be in control of this phase of the project, determining when the student training was held, where it was held,

the topics covered, and the sequence in which the material was taught. As part of this phase, both teachers and students kept logs on their progress. Teacher logs included topics presented, time taken for training, difficulties encountered, and solutions which were found to be helpful. The student logs included the amount of time using the equipment, the subjects researched and the programs used to carry out this research, difficulties encountered, as well as other comments about students' use of the system. Samples of these logs are included in Appendix C. Teachers were also encouraged to write lesson plans and develop teaching materials. Some excellent examples of these can be found in Appendix D, which delineates the topics and skills introduced. We have included lesson plans which address the needs of both low vision and braille reading students. These procedures could be replicated for many academically-oriented students.

The operation of the equipment and Internet access was taught to each student on an individual basis, allowing teachers the opportunity to gear lessons specifically to their students. Since the students began their instruction with various levels of computer knowledge, some teachers were required to begin focusing on basic computer skills, while others were able to start with the adaptive software and then proceed to Internet exploration.

The following summarizes the steps that were taken to introduce the system operation to the majority of students:

I. **Basic computer operation**
orientation to the computer, its connecting devices, keyboard layout, running application software, power saving features, battery charging, and computer care.

II. **Introduction to word processing and assistive technology**
creating, saving information, retrieving, and editing. Adaptive software usage (screen enlargement or screen reading software), setting parameters, and moving through a document. Printing to an ink-print printer, or translating into braille, and printing to a braille printer.

III. **Introduction to the Internet**
Where did it come from? What can a person do with the Internet? Discussing e-mail, Usenet newsgroups, subscribing and unsubscribing to newsgroups, reading articles, the World Wide Web and saving information from the Internet.

Once the students were able to master these tasks, the teachers developed worksheets and activities to review or enhance the students' skills. Although the amount of time required for students to learn how to access and use the Internet independently varied considerably, all students were successful by the close of the project. The information they discovered was used in a variety of ways. Very often, they browsed just for personal interest, used information found for school reports, or to enhance what they had learned in their classrooms. Another very important use was to communicate with others through electronic mail.

Time Allotment for Training

The majority of teachers used time during their students' resource period or study hall for instruction. This would allow them from 40 to 50 minutes for training on specific topics. Although this was the most convenient method for many, it often proved to be an inadequate amount of time, especially for accessing and exploring the Internet. Many teachers and students remarked that they would just arrive at an interesting site and want to begin to download information, when the bell would ring for the next class period.

It was found that the teachers and students who had the greatest success and least amount of frustration were those who arranged to have instruction after school hours, either at the student's home or at school. This gave them the opportunity to be more relaxed and less constrained by time limits of the school day.

Since each student began the program with a different background in computer experience, the amount of time to master the system varied greatly. A few exceptional students were comfortable with all of the equipment after a few one-hour sessions, while others took the entire school year to become totally self-reliant. The length of the training period was determined by the amount of time the teachers and students were able to devote to the training as well as the student's experience with technology. The average length of time appeared to be approximately 4-5 months.

Location of training

As mentioned previously, the majority of teachers and students held the instructional sessions at their school during study hall or resource hours. A

few were able to have their training sessions at the student's home after school hours. The home locations had the advantage of guaranteeing more freedom from time limitations and problems with telephone access. Often teachers had difficulty obtaining an outside telephone line through the school, or merely getting the system to work through the school's phone system. This could cause much frustration for both the teacher and student, especially when the time was so limited during the school day.

Another option that Project VISION was not able to provide, but which was recommended by many teachers, was a summer session or "computer camp" where the students could concentrate solely on developing their skills in technology and Internet access.

Difficulties Encountered by Students in Project VISION

The following list represents the most common problems encountered by the students while they were undergoing training. These difficulties were resolved in one fashion or another by the RDI staff and/or their teachers. In most cases, additional training focusing on these problems was sufficient to overcome them. The list is presented here to alert the reader to the possibility that some of these difficulties may arise during the course of training. The list is organized into three categories: general computer usage, methods for using Windows software, and using the selected adaptive products (screen reading software, braille translation and screen magnification).

Computer Usage

1. The layout and techniques available for navigating through the various screens.
2. Connecting external devices to the computer such as printers and speech synthesizers.
3. Connecting the phone line to the modem.

Internet Usage

1. The inability to get on line due to a busy signal. This was especially prevalent during regular school hours.
2. Inability to access a specific Internet site.

3. Finding and accessing information available only in gopherspace.
4. Problems using Telnet to access some libraries and BBSes. Some difficulties were noted with the procedures for entering and exiting specific libraries, as well as using the variety of commands and screen layouts. Some students also noted some problems with saving and printing information they desired.
5. Problems using the World Wide Web. These included: the time it took to access commonly used sites (such as What's New, or What's Cool) and to download large files from the WWW. Another problem was the frequency of unsuccessful or irrelevant search results.
6. Subscribing/unsubscribing to newsgroups.

Adaptive Software

The low vision students encountered fewer problems using their respective adaptive equipment than did the blind students. Since the difficulties encountered by the low vision students were of types indicated above, the rest of this section lists problems the blind students encountered.

1. Locating the cursor and navigating within and around the various Window screens.
2. The number of commands that had to be learned. In addition to the Windows and the software used to access the Internet, the blind students also needed to learn the commands to operate the screen reading software, and the braille translation program.
3. Accessing the spell checking and thesaurus features of the word processing program; also determining the cursor's position when editing documents.
4. WWW—finding a link, moving the mouse pointer to it, then activating the link.
5. E-mail—difficulty tracking the cursor within the text of new messages.

Technical Support

It is essential that the teachers receive adequate support in their efforts to learn to use the equipment and software as well as to train their students in the procedures for gaining access to the Internet. The RDI staff provided that

support in two ways. First, the teachers were encouraged to communicate with RDI's computer specialist via telephone or e-mail. Secondly, on-site visits were made by RDI staff. Voice communication by telephone was used to resolve immediate problems and to guide the teachers in rectifying difficulties which were pressing. E-mail was used later in the project when the teachers and students were much more capable of using the hardware and software. That means of communication was used in resolving problems of a less pressing nature. On-site visits were used in the case of problems which could not be remedied by telephone or e-mail.

How Visually Impaired Students Used the Internet

Students used the wide range of information which they gathered from the Internet in a variety of ways. They reported using data for special school reports and projects. They were particularly interested in historical subjects, current science topics, and biographical information on persons ranging from historical leaders to popular sports figures. Some also sought additional information based on topics addressed in their classrooms to further their knowledge of a subject or clarify any confusion they may have had during class discussion. They often searched for medical information, especially subjects pertinent to their own eye conditions—including support groups and research.

Much time was spent by just browsing through the various sites on the World Wide Web, getting information through newsgroups, and at times communicating with others via electronic mail. One student chuckled as she told of the amazement of her fellow students in a classroom when she stated an obscure fact she had learned about a particular subject. They asked her, "How did you ever find out about that?" She never told them, but it was from browsing through the Internet, often when she was unable to sleep at night.

A high school senior reported that his performance at school was greatly improved during his last year through the use of the computer equipment and access to the Internet. He not only required less time to do his assignments and research, but he also found the quality of his work was much higher than it had been previously. In order to allow himself more time to explore the Internet, he stated that he worked harder and faster on his regular class assignments.

A student who was a junior at a math and science academy reported that, by using the computer with Internet access, he reduced the time to complete his foreign language assignments from three hours to 25 minutes by utilizing the on-line dictionary. He was also pleased that he was able to better organize his work area with decreased use of the CCTV, books, and papers on his desk top.

Some students found it quite fascinating to communicate with others they had met through organizations' web pages, including organizations that focus on visual impairments. This was particularly exciting for individuals who had visual conditions that were rather rare and in cases where the student had never met or spoken with anyone else who shared their visual problem. This enabled them to not only make contact with a peer, but share information and helpful tips that were beneficial to both of them.

One of the student participants, who is also profoundly deaf, was pleased to report that he used the Internet to find information about current movies that were playing in the area. He said that in the past he was never able to participate in conversations with his peers about movies, because he rarely would have a chance to go to them. By reading the movie summaries and reviews on the Internet, he was happy to be able to join in conversations about these movies with others.

These are but a few examples of the very real ways in which the expanded access to information via the Internet impacted the lives of the students who participated in Project VISION. Similar projects can help to provide more equal access to the enormous amounts of information so critical to blind and visually impaired students' lives.

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Appendix A

Hardware and Software Used in Project VISION

Hardware and Software Used in Project VISION

Hardware

Computer:	Toshiba 1910
Modem:	MegaHertz XJ1144
Printer:	Hewlett Packard Deskjet 520 Inkjet Printer

Software

Operating System:	MSDOS 6.2 and Windows 3.1
Word Processor:	WordPerfect 6.1 for Windows
Network Dialer:	Trumpet Winsock 2.0B
Web Browser:	Netscape Navigator
E-mail:	Eudora
Newsreader:	Trumpet Newsreader
Gopher:	WS Gopher
FTP:	WS FTP
Telnet:	Ewan

Blind Students

Screen Reading Software:	Artic Business Vision and WinVision
Speech Synthesizer:	Artic Transport 615
Braille Translator:	Duxbury for Windows
Braille Printer:	Braille Blazer

Low Vision Students

Screen Magnification:	Zoomtext Plus

Appendix B

Topics Included in the Teacher Training Component of Project VISION

Training Topics

This appendix contains an outline of specific topics covered during the teacher training workshops.

Orientation to the Computer

- Hardware Components
- Connecting Devices
- Keyboard Layout
- Turning the Computer on/off
- Running Application Software
- Power Saving Features
- Low Battery Indicators
- Charging the Main Battery
- Computer Care

Introduction to the Internet

- What Can You Do on the Internet?
- What's on the Internet?
- Accessing the Internet
- Account Types
- Available Tools
- Structure of the Internet
- Connecting to the Internet

Electronic Mail

- Parts of an E-mail Message
- Basic E-mail
- Reading Mail
- Tips for Writing E-mail
- Sending Mail
- Finding Text Within Messages
- Internet Addresses
- Expressing Emotions
- Discussion Lists

Usenet Newsgroups

- What Are UseNet Newsgroups?
- Group Organization

Article Components
Using a Newsreader
Joining a Newsgroup
Quitting from a Group
Reading Articles
Article Viewing Options
Creating New Articles

Using Telnet
What is Telnet?
Starting Telnet
Telnet Addresses
Telnet Command
Using the Telnet Program
Connecting to Libraries Located on the Internet
Connecting to Bulletin Boards

Using FTP And Archie
What is FTP?
Using FTP and Archie
Connection Procedures
Finding Files to Download

Using Gopher
What is Gopher?
Starting Gopher
Navigating Through Gopher Menus
Information Types
Searching Gopherspace

The World Wide Web
What is the World Wide Web?
Starting Netscape
Screen Layout
Parts of a Web Page
Navigating the Web
Using Web Information
Searching the Web

Saving, Printing and Retrieving Files

Saving and Printing Information
- Eudora
- Trumpet Newsreader
- WS Gopher
- Telnet
- Netscape

Retrieving Text Files with WordPerfect
- Removing Return Characters
- Text File Converter
- WordPerfect Macro
- Retrieving Text files

Printing Large Print Material

Changing the Font
- WS Gopher
- Trumpet Newsreader
- Telnet
- Eudora
- Netscape
- WordPerfect

Using the Screen Reader

Orientation to the Speech Synthesizer
- Using Batteries
- Using the AC Adapter
- Connecting to the Computer

Using the Screen Reading Software
- Issuing Commands
- Screen Reading Commands
- Mouse Movement and Control Commands
- Review Mode

Customizing the Speech

Using the Screen Reader with Other Software
- Trumpet Winsock
- WS Gopher
- Trumpet Newsreader
- Telnet
- Eudora
- Netscape

WordPerfect
General Screen
Using the Spell Checker
Open File Dialog
New File Box

Using the Braille Translator
Starting the Translator
Opening Files
Word Processing
Saving From the Internet
Formatting for Braille
Saving a Braille Version of the File
Brailling the File

Appendix C

Teacher and Student Logs

Teacher Log—Training Phase Instructions

The purpose of this form is to detail the amount and type of training that you have provided for your student. Please follow these instructions in completing the form. A separate form should be completed for each training session.

Type of training provided: Check the appropriate type of training you are working on and then detail the specific steps, subject matter, or particular software you are working with.

Examples might include the fundamentals of use of the computer, WordPerfect (creating a file and saving it), Zoom Text (modifying size, format), *Vocal Eyes* (use of the speech cursor), or using the printer. You may also detail your search through various sections of the Internet.

Time taken for training: Estimate the number of minutes and/or hours that were spent in this training session.

Progress made: What has the student learned? What do you plan to go on to next?

Difficulties encountered or special attention needed: Briefly describe any problems which you may have encountered during the training session. If you have found a solution, or "a way around the problem," describe that also. If you did not encounter any problems, just write "None."

If you have problems that you are unable to solve on your own, call your resource for technical assistance.

Comments: Include any positive or negative remarks. Please also describe periodic interactions with your student's classroom teachers or parents regarding the student's use of the computer and the Internet for their assignments or personal purposes.

Teacher log—Training Phase
Project VISION

Log Period _____

Teacher:_____ Student:_____ Date:_____

Type of training provided:

General Computer _____	Word Processing _____	Internet Software _____	Adaptive Software _____

Specify: _____

_____

_____

Time taken for training: _____

Progress made: _____

_____

_____

_____

Difficulties encountered or special attention needed: _____

_____

_____

_____

Comments: _____

_____

_____

_____

Student Log—Instructions

A macro has been set up within Word Perfect that will prompt the student for the required information. After the data have been entered, a page of information will be generated. The log may then be reviewed and any corrections may be made at that time.

To start the macro:

1. Select TOOLS, then MACRO, followed by PLAY or ALT F10. The Play Macro box will appear.
2. Type NEWLOG and press ENTER. You will then be prompted for the following information:

DATE: Enter the date that the computer was used.

STARTING TIME: Enter the starting time of the computer usage. The times must be in military format with the hour designation first, followed by the minute designation. For example, if the session was started at 2:35 p.m., the starting time entered would be 1435.

ENDING TIME: The ending time follows the same procedure as the starting time.

CONTENT CODE: The content code describes the purpose of the computer usage. The values are:

I - For finding or using information
S - For social interaction
Q - Quit this section of the form

The following items are requested if the content code entered is an I or S.

SUBJECT: Describe the subject for the computer usage.

 # OF PROGRAMS: Enter the number of programs used to research/complete the subject given above. The number will determine how many times the following types of information will be requested.

PROGRAM CODE: Enter the letter that corresponds to the program used. Enter only one letter. The possible choices are:

E - Eudora
F - FTP

G - WS Gopher
L - Telnet
N - Netscape
T - Trumpet Newsreader
W - Word Perfect

NUMBER OF MINUTES: Enter the number of minutes that the specific program was used.

The following information will be requested when Q is entered in the content code:

DIFFICULTIES: Describe the difficulties encountered.
COMMENTS: Enter any comments you wish to make.

FILL IN ANOTHER FORM: Finally, you will be asked if you want to fill in another form. If you do, press Y, otherwise N. If you enter a Y, the prompts will be started again.

After all the forms have been completed, you will be located in the file that contains all the completed forms. You may review and edit the file as you would any Word Perfect document. When finished, save the file.

To save your file: Select FILE, then SAVE, or press CTRL S.

Sample Student Log

DATE: 8 8 95 LOG PERIOD: 1
NAME: K.W.

INTERNET SESSION

STARTING TIME: 1115
ENDING TIME: 1440
TOTAL TIME:

SOFTWARE USAGE

Code/Subject	Program	Time
i football trades	Trumpet newsreader	30
	Netscape	25
i weather forecasting	WS Gopher	30
s personal	Eudora	15
i computer virus	Netscape	15
	Telnet	20
	Word Perfect	35

DIFFICULTIES:

COMMENTS:

Appendix D

Sample Lesson Plans

NOTE: The screen reading/speech commands found in the following lesson plans are specific to the program, WinVision. These commands may be different for other screen reading programs.

Lesson Plan 1:
Overview of the Internet

Lecture:

What is the Internet?
The Internet is the world's largest computer network, hooking computers together so they can communicate. As of August, 1994, there were more than 20,000 networks on every continent including Antarctica and the South Pole. Internet connects greater than 3 million computers with over 1,000 new networks and 100,000 computers being added monthly.

Advantages of using the Internet are:

- A person can talk to people all over the world for only the cost of a phone call.
- Researchers can use the Net to maintain databases of rapidly changing information.
- One can locate information on almost any topic imaginable. Nearly all the software on the Net is free.
- One can buy and sell over the Net.

Where did the Internet come from?
It was started by the Department of Defense in 1969 as an experiment to link the DOD with military research contractors and universities doing military funded research. At this point it was called ARPANET. If one of the network links were to become disabled due to enemy attack, the traffic on it could automatically be rerouted to other links. In the 1980's universities in general got into the picture because they needed to network in order to be more efficient. Next, the National Science Foundation set up five supercomputer centers for research use and allowed researchers from all over the world to use ARPANET. Unfortunately, the plan to use ARPANET did not work, so the NSF built its own, much faster network—NSFNET. This was so efficient and so much business moved to it, the ARPANET closed down. By 1994 several commercial Internet networks had grown up within the Internet and are currently taking over the traffic which used to be handled by NSFNET.

What is so great about the Internet?
E-mail is the most widely used service. It is an inexpensive long distance service—if you have an account with an Internet Service Provider, you have

an e-mail address. Yours is _____ no spaces between entries. Your password is _____ no spaces between entries. On e-mail you can get anything you could get via standard mail or a phone call—recipes, gossip, the latest sports scores, etc. Additionally, mailing lists allow you to join discussion groups and meet people all over the world.

On-line conversations
One can talk in real live conversations, to people all over the world.

Information Retrieval
Millions of computers have files that are free for the taking—examples are the US Supreme Court decisions, library card catalogues, and software ranging from operating systems to games.

Bulletin Boards (Usenet)
This is the world's largest bulletin board with information on more than 6,000 subjects from computer stuff to hobbies, to public databases or vast software libraries, to political discussions or selected jokes. You can subscribe to newsgroups of interest for free—ask a question and be ready for the answer from 20 million strangers!!

Games and Gossip
A game called MUD (multi-user-dungeon) can absorb all your waking hours. You can download scads of games from the files of other Internet computers. Join a chat group to talk to others all over the world. Inter Relay Chat is a party line, frequented often by bored college students, who want to talk about a variety of topics.

How Do You Access the Internet?
One must belong to an organization with access or subscribe to an on-line service such as America On Line, Compuserve, or a myriad of other Internet servers that are springing up locally. Local providers can make available unlimited access service without long distance charges.

You need only three things to access the Internet:
1. Computer, modem, and phone line
2. Communications software
3. An account with an Internet Service Provider.

There are three types of accounts—Unix shell accounts, SLIP/PPP, and those provided by commercial providers like America Online. We are using a

SLIP/PPP account which allows you to download information to the computer and use every tool that the Internet offers. Note to Teacher: Open up Internet on the student's computer to display the Internet menu.

Following are some of the tools that our server uses:

TCP Manager (Trumpet Winsock) must be opened to use any Internet tool. It must be closed when each Internet session is completed.

Eudora (E-mail) allows one to exchange messages with others around the world including subscribers to commercial on-line services such as Genie, Delphi, etc. All that is needed is their e-mail address.

FTP (File Transfer Protocol) allows you to transfer files from one Internet computer to another. You may search for, list, and retrieve files. (Archie indexes files from over 900 FTP sites.)

Gopher lets users browse the Internet resources, read text files and retrieve files.

Finger lets you gather identifying information about anyone using the Internet (i.e. real name and postal address.)

Telnet allows a user in one location to use the Internet to tap into a computer in another location. Then that computer can be used as if it were part of your own network. You can access library card catalogues or bulletin boards or even be involved with interactive role-playing games.

Trumpet Newsreader allows you to read and post articles to the Usenet. Usenet, although not technically part of the Internet,has millions of e-mail messages organized by more than 2,500 categories called NEWS-GROUPS. Prefixes can help you determine what type of category the e-mail is in (i.e., "comp" would be computers, "rec" would be recreational, etc.) Netscape allows one to access the World Wide Web. You can find information on any topic through the Web. Documents are linked to each other so you can move from one document to the next without a menu.

Organizations providing free access to the Internet

If you do not have your own equipment and Internet account, the following organizations provide free access to the Internet.

1. Public libraries
2. Businesses
3. Colleges/universities

Once you learn to use these tools, you have an entire library and more for your own personal use, at any time of the day, by simply plugging your modem into a phone line and opening up the Net!

Note to Teacher: give the student a copy of Introduction to the Internet lecture notes, *Internet for Dummies* and *Every Student's Guide to the Internet* to complete the following assignment.

Assignment

Reply to the following:

1. What is the Internet? Why would one want to learn to use it?
2. Trace the history of the Internet.
3. Name 3 Internet Service Providers.
4. Name the three items needed to access the Internet.
5. List what one could do with the following Internet tools: Gopher, TelNet, FTP, Eudora, Netscape, Trumpet Newsreader.

Taking a minimum of 45 minutes, scan through *Every Student's Guide to the Internet.* Locate 10 items of interest, list the heading, page number, and type of tool needed to gather the information described.

Lesson Plan 1A:
Using the Speech Synthesizer and Screen Reading Program

About the Speech Synthesizer

1. Show the student the speech synthesizer and let him or her handle it. Orient the student to the unit by explaining the positions of the volume control and on/off switch, the tone control, the mode switch, the earphone jack, the power adapter plug, the serial port connector and the auxiliary connector.
2. Explain the correct procedure for connecting the speech synthesizer to the computer (using the appropriate cable). Also explain how to attach the AC adapter to the unit.
3. Explain any charging procedures and battery life. (Can the adapter be used to charge batteries as well as operate the speech synthesizer?)
4. Explain the procedure for turning the unit and computer on. (Must the speech synthesizer be turned on **before** the computer is turned on?)

Using Speech

Since all of the various programs often have different commands for speech, it may be beneficial (and easier) for the student to learn the speech commands as he or she learns each program. When a specific program is introduced, such as WordPerfect or NetScape, give the student notes during one entire session,without actually using the computer. This way, the student can develop a "cheat sheet" and use it when actually accessing the particular program. For example, when initially learning NetScape, a student can be introduced to the following speech commands, along with the NetScape basic commands:

CNTRL:	Silences Speech
CNTRL O:	Reads contents of the screen
ALT Up/Down Arrow:	Moves mouse up or down a line at a time; the line the mouse pointer is moved to is read.
ALT Left/Right Arrow:	Reads previous or next word.
Page Up/Page Down:	Moves up or down an entire screenful of information; reads new screen's contents.

The teacher should use his or her judgement as to how much additional information must be discussed or reviewed regarding the use of speech. For instance, when the mouse pointer is located on a link, the word "pointer" is spoken, along with the location of the page on the Internet.

Lesson Plan 2:
Introduction to Programs Used to Access the Internet

Have the student turn on the computer. All the programs needed to access the Internet are located within the Windows group titled "Plug 'n Play Internet." To access the files within this group, it must be opened. To open it, either double click on it or press ALT W and use the DOWN ARROW key to highlight Plug 'n Play Internet, then press ENTER.

Activity

Blind students—Once the Plug 'n Play group is opened, have the student use the arrow keys, starting with the left arrow key (the first program highlighted should be in the upper right hand corner) to slowly move through each program icon. As each program is highlighted, its name will be spoken. A brief description of each program's function can be provided by the teacher (or the student) as it is highlighted. (See Lesson 1 for list.) Then review the assignment from Lesson 1.

Low Vision students—Once the Plug 'n Play group is opened, have the student use the cursor to slowly click on each program icon. As each icon is highlighted have the student give a brief description of that program's function. (See Lesson 1 for list.) Then review the assignment from Lesson 1.

Blind students—When the student has highlighted each program,and is comfortable moving through the Plug 'n Play main window,instruct him or her to run a specific program:

A. It must first be highlighted (again, the student will know that the program is highlighted when he or she hears it spoken).

B. Press enter (the initial screen of the program will be displayed and the screen reading program will immediately begin reading the screen).

C. An alternate method of accessing a program is to go into the window menu of the Plug 'n Play Internet main window by pressing Alt Alt W, use the down arrow key until the desired program is spoken, and press ENTER.

Low Vision Students—When the student has highlighted each program, and is comfortable moving through the Plug 'n Play main window, instruct him or her to run a specific program:

A. Use the cursor to locate the program icon.

B. Double click on the icon to open.

Lesson Plan 3:
Logging On To the Internet

Connection Procedures:

To connect to the Internet, follow these steps·

Low Vision Students:

1. Run the Trumpet Winsock program. To do this, either double click on its icon or use the ARROW keys to highlight the text"Trumpet Winsock" and press the ENTER key. The initial Winsock screen will be displayed. It contains some technical information about your Internet account.
2. Dial into the Internet. To do this, select the menu option DIAL, then LOGIN. The modem will call the Internet server's computer and you will be connected.
3. The student should hear the computer dialing and then the line ringing or a busy signal. If a connection is made, a high-pitched tone will be heard. At times the line will be busy and the user will hear a busy signal instead of ringing. When this occurs, the user should wait 20-30 seconds, then try the procedure again until a connection is made.
4. Wait until you see the message saying that you are connected. It should appear within 30 seconds after the phone has been answered.
5. Once the connection is made, the user will be prompted to key in his/her password. The prompt is spoken, but the password is not, as the student keys it in. This is to prevent others from learning the password.
6. MINIMIZE THE WINSOCK PROGRAM. To do this, click on the Minimize button or press the ALT key followed by the LEFT ARROW. A menu will appear. Select the Minimize option. The program's icon will appear in the lower portion of the screen, and the Plug 'n Play Internet group will be displayed.

You are now able to run any of the Internet programs mentioned previously.

Blind Students

1. From the Plug 'n Play Internet menu, have the student run the Trumpet Winsock program. (Since all the text occurring on the screen will be read,

and this can be time consuming, the CNTRL key can be pressed to silence the speech.)

2. Next, instruct the student to press Alt Alt D to go into the dialer menu. The word "dialer" will be spoken.
3. LOGIN should be the first option in the list and will already be highlighted. The student should now press ENTER. The student should hear the computer dialing and then the line ringing or a busy signal. If a connection is made, a high-pitched tone will be heard. At times the line will be busy and the user will hear a busy signal instead of ringing. When this occurs, the user should wait 20-30 seconds, then try the procedure again until a connection is made.
4. Once the connection is made, the user will be prompted to key in his/her password. The prompt is spoken, but the password is not, as the student keys it in. This is to prevent others from learning the password.
5. After keying in his/her password, the user will be returned to the Plug 'n Play Internet window. Trumpet Winsock is still"running" but additional programs can now be run simultaneously.

To disconnect from the Internet, **all students** may follow these steps:

1. Close any Internet program you have running.
2. RESTORE WINSOCK. To restore Winsock, either double click on the icon located IN THE LOWER PORTION OF THE SCREEN or hold down the ALT key and press the TAB key. A box that contains the name of a running program will appear. Repeat these keystrokes until the box reads: "Trumpet Winsock."
3. Select the DIAL option from the menu, then select BYE.
4. Wait until you see the disconnect message. It should take no more than 15 seconds after the BYE command was used.
5. Close the Winsock program.

Lesson Plan 4:
Introduction to E-mail

Lecture:

Structure of E-mail
Each e-mail message has up to three parts:

1. Header: holds the destination, your "return address," and a description of the subject.
2. Body: contains the text of the message.
3. Signature: your name, e-mail address, and any other information you would like to share.

Note to Teacher: (Pull up a message the teacher has sent to the student and examine these parts.)

Discuss the e-mail screen while the screen is on the monitor. Call attention to **Mailbox**. This is where the mail is saved. **In** stores your incoming mail and **Out** stores your outgoing mail. The **Trashcan** is used to hold the messages you want to delete. You must empty the trashcan to permanently delete the messages.

Expressing Emotions
Since the Internet started out as a text based communication tool, people were limited in their ability to convey any emotion concerning the topic they were discussing. To get around this limitation, people use a combination of emoticons, acronyms, and communicons within the body or signature of an e-mail message. Examples might include smiley faces, special use of capitalization and punctuation, and acronyms for commonly used expressions.

Activities

Creating a Message
1. Run the Trumpet Winsock program.
2. Select DIALER, then LOGIN.
3. When connected, MINIMIZE Trumpet Winsock.
4. Run Eudora. You will then be prompted for a password.
5. Enter your password and press ENTER.

6. Select MESSAGE, then NEW MESSAGE. A form will appear on the screen. It is very similar to the form most businesses use for completing memos. The form contains fields for the header and the body of the message. To send mail, the following fields MUST be filled in CORRECTLY. **TO**: (fill in with your addressee); **FROM:** (already filled in with your Internet address). Once the address has been filled in, press the TAB key to move to the subject field.
7. Enter the reason for the message and press TAB. The cursor then jumps to the next field. Press TAB two more times. This will move the cursor below the line that separates the header from the body portion of the message.
8. Enter the text for the body of the message.
9. When complete, either click on the SEND button located in the upper right hand corner of the screen, or select MESSAGE, then SEND IMMEDIATELY.
10. A series of messages will appear on the screen. These messages indicate the progress in processing the message. The last message indicates whether the mail was successfully delivered or not.

Checking for Mail

1. Start Eudora, if it is not already running.
2. Select FILE, then CHECK MAIL.
3. You will then be prompted to enter your password. The password is the same one you gave when your account was activated. THE PASSWORD IS CASE SENSITIVE. IT MUST BE ENTERED EXACTLY AS YOU GAVE IT.
4. If the password was entered incorrectly, you will get an error message, and you will have to start this process over again.
5. If the correct password was entered, your account will be checked for new messages. If there are any, a message will appear on the screen and a little tune will be played. Press ENTER. If you have no new mail then you will see just the menu on the screen.
6. If there is mail, a list of the messages located in the IN box will appear.

Reading Mail

When you have an open mailbox, a summary of each message contained in the mailbox will be displayed. The summary consists of the following five parts.

1. The status and priority of the message.
2. The name of the sender.
3. The time and date the message was sent.
4. The size of the message. The size is stated in terms of thousands of characters.
5. The subject.

To read a message, use the ARROW keys to highlight it and press ENTER. The complete message will be displayed. After reading the message, you have to decide what to do with the message. You can close it, send a reply, delete it, save it to a file, or forward it to someone else. All of these options are covered below.

Closing a Message

Closing a message does not delete it; it simply removes it from your view. To close an open message, select FILE, then CLOSE. A closed message can be reread at any time by selecting MAILBOX from the menu; then choose the mailbox in which the desired message is stored.

Replying to a Message

Note to Teacher: A message should be sent ahead of time, so the student can reply.)

1. Open the IN mailbox by selecting MAILBOX from the menu, then IN. A summary of all the messages located in the mailbox will be displayed.
2. Use the ARROW key to highlight the summary of the message to which you want to send a reply.
3. Select MESSAGE from the menu, then REPLY. A form will appear. This form already has the To:, From:, Subject:, and the body portions filled in.
4. To remove the extra text, highlight the material to be deleted, highlight the text and press the DELETE key.
5. To add new lines at the end of the message, use the DOWN ARROW key until the cursor is on the last line, then press ENTER. Now enter the new text.
6. When you are ready to send the reply, select MESSAGE, then SEND IMMEDIATELY.

Emptying the Trash Can

To view a list of the messages currently in the trash can:

1. Select MAILBOX, then choose TRASH.

2. A summary of all the messages in the trash can will appear.

To read a message, highlight it and press ENTER.

To retrieve a message from the trash can:
1. Highlight the message to be retrieved from the trash can.
2. Select TRANSFER, then move the mouse pointer to IN and click. The message will disappear from the trash can and reappear in the IN box.

To empty the trash can:
Select SPECIAL, then EMPTY TRASH. All the messages that were in the trash can are now PERMANENTLY removed.

Saving a Message
1. Display the desired message or highlight its summary.
2. Then, select SAVE AS . . . from the File menu. The SAVE AS dialogue is displayed allowing you to choose a name and location for the file.

Review
Discuss with the student the precautions of sending your e-mail messages only in situations where it is all right if 20,000 people read it. Discuss how using your e-mail address without caution could get you into trouble.

Assignment
1. Study your notes on Electronic Mail.
2. List the 3 parts of an e-mail address. Give 2 examples,labeling each part.
3. Check for mail twice during the week and list the names of those who have recently sent mail. Be able to tell me or show me what the mail said.
4. Send mail to me.

Lesson Plan 5:
E-Mail-Part Two

Creating a signature

1. Open signature window.
2. Type your complete name and other pertinent information: i.e. phone number, company employed, etc.
3. Close window SAVE.

Deleting information in a reply

1. Bring the message to which you want to reply onto the screen.
2. Select MESSAGE/REPLY. A form will appear.
3. Remove all the text that does not apply to the reason you are replying by highlighting the undesirable text and pressing DELETE.
4. To add new text at the end of the message, use the DOWN ARROW KEY until the cursor is on the last line, then press ENTER.
5. Enter the text.
6. Go to MESSAGE, then SEND IMMEDIATELY.

Deleting a message

1. Bring up a summary of messages for any of the mailboxes.
2. Highlight the message to be deleted.
3. Press the DELETE key.
4. The message has now been removed from the mailbox.

It is also possible to delete the current message you are reading. To do this, press CNTRL D. The message will disappear and you will be returned to the summary screen.

Printing a message

1. Bring up the message on the screen.
2. Select FILE/PRINT

Note: Some Internet programs will not print part of a message. In this case you will have to paste the message to the clipboard and then to the word processing program to save, then print from there.

Saving a message

1. Bring up the message on the screen.
2. Select FILE/SAVE AS.

3. Backspace to get rid of the name and type in a new file name.
4. Create a file to hold your Internet documents-"ifiles" is a good choice.

Forward a Message

1. Select the message from the IN box.
2. Select MESSAGE/FORWARD to transfer the header/body of the received message to the body of the new message.
3. Fill in the empty "TO:" field with the address of the person the message is to be forwarded to.
4. You can edit the text by deleting/inserting or adding more text at the end of the message.
5. Send the message by selecting MESSAGE, then SEND.

Nicknames

Nicknames can be used to store addresses of people that you e-mail regularly. Once a nickname is stored, it can be used to automatically address outgoing e-mail messages.

Creating and Using Nicknames

1. To create, edit, or remove a nickname, select WINDOW, then NICKNAMES.
2. The Nicknames window is then displayed. This window is divided into three main components. They are:

Nickname:	lists all the currently defined nicknames
Address(es):	displays a selected nickname's full Internet address.
Notes:	displays private notes associated with a nickname.

Adding New Nicknames

To add a new nickname

1. Click on the NEW button. The NEW NICKNAME dialogue is displayed.
2. Type the new nickname. Then press ENTER. The new nickname is displayed in the "NICKNAMES:" field and the insertion point is placed in the "ADDRESS(ES):" field.
3. Type the complete e-mail address of the person to be represented by the nickname. If you'd like to add someone's proper name to the address that you specify, just put it in parentheses after the e-mail address.

4. Press TAB to advance to the "NOTES:" field. The "NOTES:"field can be used to enter any text you'd like to associate with a nickname, such as the addressee's company, title, or phone number. The contents of the "NOTES" field is not put in mail you send.
5. Once you've finished typing addresses and notes, you can click the NEW button again to make another nickname.
6. When finished making additions or changes, select SAVE from the FILE menu to save the changes.

If you close the NICKNAMES window without saving the changes, a dialogue is displayed asking whether the additions/changes you just made should be saved or discarded.

Changing and Removing Nicknames

To change a nickname

1. Select WINDOW, then NICKNAMES.
2. Select the desired nickname in the "NICKNAME:" field.
3. Then, click the RENAME button. A dialogue is displayed allowing you to change the nickname.
4. Once the changes are completed, click OK.

To remove a nickname

1. Select the desired nickname.
2. Click the REMOVE button.

Saving the Changes

When finished making changes to the nicknames list, select SAVE from the FILE menu to save the changes. If you close the NICKNAMES window without saving the changes, a dialogue is displayed asking whether the changes/ deletions you just made should be saved or discarded.

Sending Mail with Nicknames

To send a new message to a person located on the nickname list:

1. Select WINDOW then NICKNAMES
2. From the NICKNAMES window, select the nickname of the person you want to send a message.
3. Select the "TO:" button. A blank message form is displayed with the selected nickname inserted in the "TO:" field. Fill in the subject and body portions of the message, then send it.

Assignment

1. Send a message to your teacher with a signature you have created.
2. Check your mail to see what signature your teacher has used on the mail he/she sent you.
3. Reply to your teacher's mail using the reply form.
4. Print your teacher's e-mail message.
5. Locate someone else who has an e-mail address and send him/her mail.

Lesson Plan 6:
Newsgroups

Trivia

Know the following terms:

POP – post office protocol

PPP – point to point protocol (scheme for connecting two computers by phone)

SLIP – software scheme for connecting your computer to the Internet

FTP – file transfer protocol, is much more limited than PPP

Introduction to Usenet Newsgroups

What are newsgroups?

These are approximately 5,000 discussion groups, each of which is organized around a special topic. Each discussion group is composed of articles posted by readers of the group. Various software is available to access newsgroups. Newsgroups differ from mailing lists because:

1. News is sent to one computer where YOU access it—it is not sent to you individually at your mail address.
2. Groups are easier to find, easier to browse, subscribe and unsubscribe, and more widely read than mailing lists.
3. Groups are organized by categories and then sub-categories to provide some description of the group's focus of interest.
4. Each group name contains at least two descriptive parts.
5. Each part is separated by a period.
6. Name progresses from most general to most specific.
   You can find a list of the major categories listed in Appendix E.

To read the articles, you must subscribe.

To Use Trumpet Newsreader

1. Run Winsock.
2. Open Trumpet Newsreader, press ENTER.
3. In the News Viewer Window:
   Line 1 and 2 contain the standard windows information.
   Line 3 is the status line.
   Next is the box which holds the list of subscribed groups.
   Next portion of the screen is used to display the summaries of the articles within a newsgroup.

Along the bottom of the screen is a button bar. The buttons provide a quick, easy method for using the program. Each button on the bar can be accessed by clicking on it with the mouse or by issuing a keyboard command.

Joining a Newsgroup

1. Select GROUP/SUBSCRIBE.
   Press ENTER to advance to the "Subscribe to Newsgroups" screen.

What you see on the "Subscribe to Newsgroups" screen:
The screen is divided into four sections:

- Upper left—major categories (i.e. top of the hierarchy)
- Upper right—holds the word search followed by the cursor
- Lower left—lists all subscribed groups
- Lower right—unsubscribed groups.

The OK and Group buttons are on the bottom line.

2. Enter part of the group's name or highlight a group in the top left hierarchy to display a list.
3. Read through the list on the right.
4. To subscribe, move the mouse to the group name and click. Notice the group has been moved into the "Subscribed Group" Window. Continue selecting as many groups as you wish.
5. When completed, click the OK button to return to the Newsreader screen. To display just the newsgroups, press the NEWSGROUPS button.

To Unsubscribe

Highlight the group you wish to drop.
Select GROUP/UNSUBSCRIBE.
Press ENTER.

Reading articles

1. Use the arrow keys or mouse to select a group, then press ENTER. The group will be scanned for unread articles. If there are no unread articles, nothing will display. If there are some, the article titles will be displayed.
2. Use the UP and DOWN ARROW keys to highlight article titles,then press ENTER to display the article.
3. Use the UP/DOWN ARROW keys to read the article.

4. To return to the article list, click VIEW/LIST. After an article is read, a ≥ symbol will appear before the article.

Selecting a Newsgroup to Read

1. If the text of the article is being displayed, use the VIEW/LIST to return to the article list screen.
2. Press the ESCAPE key and DOWN ARROW to move the highlight bar to the next group or click with the mouse, then press ENTER.

Assignment

1. Browse through newsgroups. List four that you like and tell me something you learned from reading one of the articles.
2. Forward e-mail to me in its original form and then e-mail me again with the same article—only delete the "garbage."
3. Print an e-mail message.
4. Be able to show me how you saved some mail. Place the articles in the "ifiles" directory you created.

Lesson Plan 7:
Introduction to the World Wide Web

Lecture

World Wide Web is the key to an enormous reservoir of information. Almost anything imaginable is available by simply entering search terms or addresses where information resides. You will be WOWed!

To access the WWW, a web browser is needed. We are using Netscape.

Documents on the Web are hypertexted—this means they are linked to other documents. The links are colored, underlined text within an article. Once you click on a link, you are automatically taken to another document or documents. Once in that document, you can again click on a link to carry you further—hence the reason for the name "World Wide Web."

Some basic World Wide Web concepts:

Web browser: Programs used to access and navigate through the World Wide Web.

Page: A document found on the Web. It is not a screenful of information or a hard page of information.

Internet Address: Every document has its own address, which is a string of words and abbreviations joined by slashes (/); WorldWide Web addresses start with "www".

Home Page: The first document loaded when accessing a particular site or address on the Web. Even after jumping to many links, it is still easy to return to the initial screen, or home page, from which you started.

Links: Links are words within a document that are colored or underlined. When the mouse is positioned on these words and clicked, the user jumps to a new document with its own address. Links can also take you to other resources on the Internet such as Gopher or FTP.

Blind students

Orient the student to the initial screen of Netscape after logging on and opening Netscape.

A. Inform the student that the title bar is located at the top of the screen and contains the name of the current document.

B. Under the title bar is the menu. Have the student open each menu across the top (using Alt, Alt, and a letter) and move down through each option within the menu using the DOWN ARROW key. As each option is highlighted, it will be spoken.
C. Directly under the menu is the tool bar, the location bar,the button bar, and the Netscape logo.
D. Below the button bar is the document window, where the text of the documents retrieved is displayed.
E. Across the bottom of the page is the status bar, indicating the address of a link and the status of current activity; and the progress bar, which indicates down loading progress.

Remind the student of the basic speech commands given in Lesson 1A.

There are four ways to travel in the WWW.
1. Jump from page to page using links.
2. Use bookmarks to jump directly to a page you have accessed in the past.
3. Enter the address of the page you want to access. (FILE/OPEN location or use the OPEN button and type in an address).
4. Enter search terms to find articles on specific topics.

Introduce the term URL, which stand for "universal resource locator" (basically the Internet tool and address). Later point out how it is found on the location line (current page) and the status line (the link being pointed to by the mouse.)
The URL has four parts:
1. web tool-http:// ftp:// Gopher:// etc.
2. Computer name and location (computer name/organization name or type, etc.)
3. Path to get to the file (not always seen in the URL but separated by /)
4. Name of the file (may not always appear).

In the following URL, locate the parts:
http://home.netscape.com/home/whats-new.html

Activity
Open up the TCP Manager and then Netscape.
Look at the screen layout. This is the starting points page.
Select the Directory button that says What's Cool. It lists a number of interesting Internet sites.

Together, explore several of the listings. Use links and the back command to investigate more of the listings. Show the student how to place a bookmark at two locations. Draw the student's attention to changing information on the screen as we move from page to page.
Close out Netscape and then TCP Manager.

Assignment
Explore the "starting points page" on Netscape.
Using the Directory button, read the Netscape manual. You will need to read it in its entirety to pass a short quiz next week.
Low vision students may wish to print out a hard copy.

Be able to tell me two things that are new from the listing of "What's New."

Bookmark one page from the listing on the What's Cool button. (Use your Netscape manual as needed.) Be able to retrieve this page next time we meet.

Confine your Netscape exploring this week to these three buttons and their links. We will develop additional Web skills in the next lesson.

Lesson Plan 8:
World Wide Web Search Tools

Review

Briefly quiz the student on some of the terminology that has been used so far:

http
Trumpet Newsreader
Internet
TelNet
FTP
html
PPP/SLIP
web browser
Gopher
URL
World Wide Web

Lecture

Today we are going to discover how to locate information on the Web simply by typing in search terms. One of the criticisms of the Web is its lack of organization. If you want to find information simply by using a search term, you will need to call on **search engines**, such as **"worms," "spiders," "robots,"** and **"wanderers."** These are common names for initiatives undertaken to help organize the resources on the Web in ways that users are more familiar with. Catalogues and indexes provide one method of locating documents whereas search engines offer a broader means of locating information.

A list of some of the available search tools follows:

CERN Virtual Library (http://doppler.thp.univerie.ac.at/www.html)This is one of the most comprehensive directories on the Web, including links to other subject catalogues.

ElNet Galaxy has a nice organization of subjects and some great tools for searching its catalogue.

Planet Earth Home Page (http://www.nosc.mil/planet-earth/info-modern.html) has a smaller index but a great Getting Started page for newcomers.

Yahoo is one of the most popular launch pads. It offers searches, a What's New page, and a Top 50 page. This is a good place to find new resources as automated robots search new sites out on a regular basis.

Whole Earth Catalog is another source for up-to-date information. It has a What's New page and uncluttered organization of topics.

Web search engines do the sorting work for you. There is no ultimate search tool for the Web so try as many as you can. The same term listed in different search engines may produce different results because different engines use different search techniques. An engine can make a depth first or breadth first approach.

A depth first search is very comprehensive as it begins with a given document, searches all its links and then proceeds to do the same for other documents it chooses. A breadth first search focuses on cataloging a wide array of top level documents and does not attempt to follow all links.

Some interesting search engines follow:

Web Crawler indexes not only URLs and titles, but also the contents of articles. It is an excellent tool for finding a wide range of references.

Lycos is a very ambitious hunter. It likes to select documents with multiple links pointing to them (suggesting popularity), and weeds out sound and graphics files. Lycos not only catalogs a document's title and headings but also the first 20 lines and the 100 most important words. In effect then, it tries to summarize a document to preserve its content. There are two databases to search: The smaller one has 237,000 entries and the larger catalogue has more than 1.2 million.

World Wide Web Worm holds an excellent tutorial on how to search with this tool. You can not only search for subjects, addresses,and content, but also for URL based, content based, and even filename based items (i.e. MPEG files).

RBSE isn't as comprehensive as Lycos but is a good way to glean content from the Web without hauling down a huge load of information. It is best for locating links to get you started in a subject area.

CUI W3 is like a wholesale warehouse of the net. Be prepared to complete the necessary forms.

Also try InfoSeek, All-in-One-Search Page, Internet Exploration Page, Open Text, and Savvy.Search

For more information on search engines, locate:
http://www.rpi.edu/~decemi/cmc/mag/1994/sep/spiders.html.
Also locate: http//web.nexor.co.uk/mak/doc/robots/robots.html and http://home.mcom.com/home/Internet-search.html.
(Clicking on the Net Search button can bring you to this last page.)

Activity

Open up Netscape.
Together, using the Net Directory and Net Search buttons, locate some search tools.
Bookmark them.
Hand out a copy of today's lesson plan to the student as the search tools listed will need to be located for the outside assignment.

Assignment

Locate as many of the search tools listed on the handout as you can. Remember that you can enter addresses if you have them, or enter tool names or other appropriate search terms inside currently running search programs to make good use of the Web capabilities.

Place bookmarks for each. Place all the new bookmarks at the top of the bookmark list.

Perform a search using the same search terms using three different search tools.

Print out a list of hits for each search tool. List two you liked and two you hated and describe your reasons.

Student's Review Sheet
Review: Saving Files, Printing, Converting to Word Perfect, and Fonts

Check to be certain the student can easily save and, when possible, print selections using each of the Internet tools listed below. If he or she is having any difficulty, allow the student to use information below as needed. The student should receive a copy to keep for themselves as a quick reference guide.

Saving Information from the Internet

Trumpet Newsreader

1. Bring article to the screen. Select article.
2. Select SAVE TO FILE, press ENTER. The student will get the "SAVE AS" window. Press BACKSPACE to get rid of the last file name and type in a new file name—it should be saved in the "ifiles" directory, press ENTER.
3. Press ALT—FILE/PRINT to print article only—do this if you don't want it saved on the hard drive.
4. To copy a section—highlight the text you wish to save,select EDIT, then COPY to save to the clipboard-then open up Word Perfect to retrieve it.

Eudora

To save contents of e-mail without headers/footers:

1. Bring up the article
2. Select FILE/SAVE AS-backspace to get rid of name and type in new name-should be in the ifiles.
3. Select FILE/PRINT

To get rid of sections you don't want:
Select MESSAGE/REPLY, highlight and delete the undesired text. Program will not print sections-you must paste those to the clipboard and then to Word Perfect to save.

WS Gopher

1. Bring file onto screen.
2. FILE/SAVE item, press ENTER and name.

If you wish to download the image, you must check "SAVE FILES FOR LATER USE" or it won't be saved!

Netscape
Links will be saved but headers/footers won't.

1. Bring article onto screen
2. Select FILE/SAVE
3. At the bottom of the screen, select SAVE AS TEXT FILES—you do not want htm extension.
4. To print—bring FILE on screen and click on FILE/PRINT

FTP
This tool automatically saves everything but can't print it!

Check to be certain the student is easily converting files to Word Perfect program.

Converting Internet Files to Word Perfect Program Files
Click on Textfile converter to remove character returns. (This needs to be done with each Internet file before entering the word processing program to adapt/edit/print, etc.)

1. Type in the file name (don't need to type in path).
2. Type in file name to save text to: _____
3. At "new line length," type in "o" to get rid of returns.

Files must be ASCII DOS to be convertible.

For shorter documents, Word Perfect macro will remove the returns within sections. To use this, place the cursor at the beginning of the paragraph, highlight ALT T, then macro, then press ENTER, and type FIT ASCII in the file name.

Be certain the student is aware that the type size can be changed within most Internet programs. This may allow some students to work at the monitor without employing the screen enlargement program.

Fonts
Font sizes can be changed on the screen in Trumpet, Gopher and Eudora, but not in Netscape. If you do this, however, there are problems when you are

ready to print, since everything will be cut off at the 8" margin. In Eudora you will have long and short lines.

"Arial" is a good font to use because it is thick and dark.

In Netscape, you can change the font by doing the following:

1. Select OPTIONS, then PREFERENCES.
2. Choose FONTS, SIZE, etc., and then click on OK. This could make it easier to read once the size is changed.

Fonts can be changed in each Internet program individually. In *Eudora*, go to SPECIAL, then CONFIGURATION. You can set up different screen and printer fonts. Be aware that 8-10 points must be used to fit into the first line of the address. In *Trumpet Newsreader* go to SPECIAL, then FONT. You are limited to 15 point size.

Some Additional Assignments

Internet assignment using FTP, Gopher, and WWW
List at least three sites, including URLs, to obtain software. Be prepared to show me their bookmarks and what you found. Use WWW, Gopher or FTP.

Electronic Books Assignment
Your assignment, should you decide to accept it, is to use at least two different tools on the Internet to investigate electronic books and magazines or newspapers. Your records must include the Internet address and, whenever possible, the printout of some of the information you found. You must also locate the scoop on Project Gutenberg. What is it and what can it do for you? Mission results are due on _____.

Signed,

Cyberspace Secret Agent 009

Internet Checklist

When Internet training is completed, the expert student should be able to complete this Internet Checklist, using their notes as needed . . .
Can you....?

Using TCP Manager . . .
login/logout to the Internet
after using any Internet program, restore Winsock and disconnect?

Using Eudora . . .
list 3 things you can do with this program
give your e-mail address and password
list two security concerns when using your address
create a signature
create, add, change, or remove a nickname
create and send a message
create a message using emoticons/communicons/acronyms
check for and read your mail
use menus to find specific text within a message
reply to and forward a message
delete messages
describe a discussion or mailing list
subscribe/unsubscribe to a listserv
post a message to a listserv?

Using Trumpet Newsreader
describe how a newsgroup is different than a listserv
describe how group names are organized to help locate desired topics, provide two examples
list 10 different topical newsgroups you could join
subscribe/unsubscribe to a group
read articles—mark as read
post an article to a test group-verify that a message was sent use buttons/keyboard commands/menu options to access the articles in the previous/next newsgroup
view the highlighted article
skip all the retrieved articles and load articles from the next group

post/follow an original article to the group
save an article to your computer?

Using Telnet...
describe Telnet and its most common uses
locate a small university/college that will allow you to use ERIC, Books in Print, or Reader's Guide
access the card catalogue of a public library and list 3 sources of information on a specific topic
access local information about a city/college
access CARL, CERN, and LOCIS
use a Telnet address to locate specific information (i.e. illinet.aiss.uiuc.edu)
save screen text to your hard drive
describe a bulletin board and its services?

Using FTP/Archie...
define FTP and list its uses
define Archie and list its uses
use search terms in Archie to locate a desired file
list the extensions which indicate a file is compressed
view/download/decompress a file?

Using Gopher/Veronica...
describe Gopher and list its uses
describe Veronica and list its uses
search GopherSpace using Veronica
bookmark 3 favorite sites
use an existing bookmark to return to a site
delete a bookmark/category
directly use a Gopher address to access information
describe Gopher icons
describe 3 common Gopher error messages?

Using World Wide Web...
describe WWW and its uses
describe the screen layout and the information that each section holds
move within a web page
use the *"find"* command to find a word within the current page
use links, bookmarks, and keyboard commands to jump between WWW pages

define URLs and tell where they are found on the page
describe the URL parts and the purpose of each
part speed up downloading of files by turning off in-line graphics option (option/autoload graphics)
stop downloading a page
review previously loaded pages by using the history list
manually enter an address
save Web information
print a current page
retrieve, add, remove, edit and rearrange bookmarks
use the "Starting Points Pages" buttons to access What's New, What's Cool
locate, bookmark, and use at least 5 search tools—list what is great about each
describe and use a search engine (e.g., spider/worm/robot/wanderer) to search the Web using key terms
using WWW, FTP, or GOPHER locate/download electronic books—be able to describe Project Gutenberg?

Appendix E

Sample Newsgroups

Newsgroup Categories

Category	General Topic
alt	alternate newsgroups—pictures, sounds, current events, fan clubs, music info, politics, religion, sports, television
ba	San Francisco (bay area) groups
bionet	biology related
bit	newsgroups accessible with LISTSERV
biz	business, marketing, advertising
can	newsgroups from Canada
chi	Chicago area newsgroups
clari	contains Associated Press articles that many newspapers carry; major areas include US, world, and local business news, sports, newspaper columnists
comp	computers
fido	groups in Germany
hiv	HIV related information
ieee	Institute of Electrical and Electronics Engineers
info	University of Illinois mailing lists
interaccess	InterAccess topics
K12	education topics covering grades K through 12
milw	Milwaukee happenings
misc	anything that doesn't fit anywhere else
news	learn about Usenet
rec	recreation, hobbies, arts, music, pets, sports
sci	sciences of all types
soc	social issues, cultures, history, religion
talk	debate controversial topics

Appendix F

Resources About the Internet

Resources About the Internet

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Sachs, D., & Stair, H. (1994). *Hands-on Internet: A beginning guide for PC users.* Englewood Cliffs, NJ: PTR Prentice Hall.

Smith, R.J., & Gibbs, M. (1994). *Navigating the Internet, deluxe edition.* Indianapolis, IN: Sams Publishing.

Steele, H. (1996). *How to use the Internet.* Emeryville, CA: Ziff-Davis.

Tolhurst, W.A., Pike, M.A., & Blanton, K.A. (1994). *Using the Internet, special edition.* Indianapolis, IN: Que Publishing Company.

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Appendix G

Resources About the Internet in Accessible Format

Resources about the Internet in Accessible Formats

Ackerman, E. (1995). *Learning to use the Internet: An introduction with examples and exercises.* Wilsonville, OR: Franklin, Beedle, and Associates. audio, RFB

Cady, G.H. & McGregor, P. (1995). *Mastering the Internet.* San Francisco, CA: SYBEX. etext: ASCII and Bookmanager, RFB

Comer, D. (1995). *The Internet book: Everything you need to know about computer networking and how the Internet works.* Englewood Cliffs, NJ: Prentice Hall. audio, RFB

Crawford, S. (1994). *Your first modem.* San Francisco, CA: SYBEX. etext: ASCII and Bookmanager, RFB

Falk, B. (1994). *The Internet roadmap.* San Franciso, CA: SYBEX. etext: ASCII and Bookmanager

Harley, H. (1993). *A student's guide to UNIX.* New York, NY: McGraw-Hill. audio, RFB

Krol, E.(1992). *The whole Internet: User's guide and catalog.* Sebastopol, CA: O'Reilly and Associates. audio, and etext: ASCII and Bookmanager, RFB

Levine, J., & Baroudi, C. (1994). *The Internet for dummies.* San Mateo, CA: IDG Books. etext: ASCII and Bookmanager, RFB

Liu, C. (1994). *Managing Internet information services.* Sebastopol, CA: O'Reilly and Associates. audio, RFB

Marx, G., & Grauer, R. (1996). *Exploring the Internet.* Upper Saddle River, NJ: Prentice Hall. audio/being recorded, RFB

Pfaffenberger, B. (1995). *Netscape navigator: Surfing the web and exploring the Internet.* Boston, MA: AP Professionals. large print, APH

Pitter, K., et al. (1995). *Every student's guide to the Internet.* New York, NY: McGraw-Hill. large print, APH

Rathbone, T. (1994). *Modems for dummies.* Foster City, CA: IDG Books. etext: ASCII and Bookmanager, RFB

Rugg, T. (1995). *Computer freebies (and almost freebies).* San Francisco, CA: SYBEX. etext: ASCII and Bookmanager, RFB

Rutter, M., et al. (1996). *Conquering the Internet.* Cincinnati, OH: Southwestern Eduational Publishing. audio/being recorded, RFB

Sachs, D., & Stair, H. (1994). *Hands-on Internet: A beginning guide for PC users.* Englewood Cliffs, NJ: PTR Prentice Hall. audio, RFB

Strangelove, M. (1994). *How to advertise on the Internet: An introduction to Internet-facilitated marketing and advertising.* Ottawa, Canada: Strangelove Internet Enterprises. audio, RFB

Other Resources:

- Top Dot Computing: produces several tutorials about the Internet and other computer topics on tape (206-335-4894).
- National Braille Press also produces several references in braille (617-266-6160).
- American Foundation for the Blind can also provide very good resources and ideas (212-502-7639).
- Recordings for the Blind also provides an annotated bibliography of the books mentioned here (from RFB) (800-221-4792).
- American Printing House for the Blind also provides a list of resources available in accessible format (502-895-2405).